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AGRICULTURAL HISTORY

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Agricultural History is designed as a medium for the publication of research and documents pertaining to the history of agriculture in all its phases and as a clearing house for information of interest and value to workers in the field. Materials on the history of agriculture in all countries are included, and also materials on institutions, organizations, and sciences which have been factors in agricultural development. The Society is not responsible for the statements or opinions of contributors.

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MOUNT HOPE AND ITS DAIRY CATTLE

E. PARMALEE PRENTICE

Mount Hope Farm, Williamstown, Massachusetts

It is the duty of every man to endeavour that something may be added by his industry to the hereditary aggregate of knowledge and happiness. To add much can indeed be the lot of few, but to add something, however little, every one may hope. . . . Samuel Johnson, *The Rambler*, No. 129, June 11, 1751.

BACKGROUND AND OBJECTIVES

Publication of Charles Darwin's book, *The Origin of Species*, in 1859 was followed in Europe, and particularly in England, by a wave of enthusiasm for the improvement of domestic livestock which is conspicuous in the literature of the time. If the great variety of living forms which men saw around them had all come from natural selection, it seemed that the way was open by which breeders through artificial selection could accomplish in a short time what nature accomplished only in a very long time or in some cases not at all. Any person who is interested in knowing the sort of speculation which took public interest eighty years ago can find it, somewhat exaggerated, in the cartoons published by *Punch*. For example, Du Maurier's cartoon entitled "The Horse of the Future" in the number for March 7, 1874, is concerned with a fox hunt which had started purportedly in Devon and ended in Oxfordshire, the third county beyond. The horses are depicted as being two or more times the height of a man, and the fox is of comparable size. The appended explanation concludes: "Splendid fox!—One of Sir Huxley Spencer Darwin's breeding, and must have stood over three feet high!" Other cartoons give pictures of domestic poultry larger than ostriches, miraculously fat swine, etc.

Mating "best-to-best" on the principle that like produces like was, therefore, undertaken with renewed vigor. The fastest horses were put to the fastest mares; the most quickly maturing bulls to the most rapidly growing cows, etc. All this had been done before, but now it was done with the belief that Darwin had demonstrated the soundness of the "best-to-best" method and that it must, therefore, succeed. Then when the old results once more followed the old system of matings, breeders learned that after all the method was in fact essentially wrong. Hopes which seemed to have been founded on certainty failed, and there was a wave of disappointment as great as the enthusiasm had been. It still seemed that like should produce like, whether it did or not, and so faith once more was placed in pedigree, for want of any other place to put it, and men mated pedigreed stock to pedigreed stock, but the enthusiasm was gone! Good parents do not always, or even usually, produce offspring of the highest quality. And yet, what other course was open than to mate "best-to-best"?

Then slowly the idea of the progeny test arose. Mendel discovered the mathematical principles underlying inheritance about the middle of the nineteenth century, but the world did not learn the significance of his work until light began to break in the twentieth century. We know now that the secret is not to mate the best performers to the best performers, but to mate the best breeders to the best breeders, that is, to mate individuals that produce the best offspring with individuals that produce the best offspring, judging results by the progeny themselves. When this is done, we find—little by little, and step by step—that the desired change begins to appear. As generation follows generation, the change develops, becoming greater and greater, and then new questions arise. When, for example, through continued breeding of this sort, which does not stop with the use of the first successful sire but uses one high-transmitting sire after another, we find our success with rapidly reproducing animals to exceed our expectations, we begin to wonder what the limit can be, or if, indeed, there is any limit. There are still American colleges which publish bulletins on the improvement of herds through the use of sires with superior pedigrees, but they are survivals of a bygone age. For present-day breeders, hope has returned greater than ever, and in such manner that the possibilities before us seem truly to have no limit which we can yet discover. Even the cartoons in *Punch* appear less impossible since we

know that we are not breeding merely that like may produce like but that like may produce what is unlike because it is superior.

Progeny-test breeding is bringing back the enthusiasm of eighty years ago, and we have discovered that mating what is best in the modern meaning of the word will produce not merely a best which in a degree is like its parents but something far better than the parents, namely offspring which shall be ancestors of a continually improving new race. There is no end to it. A man sleeps and rises night and day and, as Mark said in his Gospel, the seed grows, we know not how. In the breeding of dairy cattle we are not mating two and two to make four. We deal with living matter, and the sum can be greater than the parts which we consciously put together. Evolution is the very process of producing something new, and the progeny test quickly performs the function which nature performs, if at all, only by slow operations. Man seems to be able thus to bring into action the power which creates what for our purposes are improved forms of life. The seed grows, and by our present methods we are sure that out of many children there will be some having better qualities than either parent, although we know not yet how this comes about. The work of the breeder, then, is to produce and use these superior children to be parents of still better offspring.

It should be the purpose of the modern breeder not merely to improve his own herd or flock but more important still to improve the race with which he deals. If he can give the world a new and better kind of livestock he will add, for the benefit of mankind, to the hereditary aggregate of knowledge and happiness, and it is in breeding of this sort that Mount Hope is engaged.

Mount Hope has been rather a complicated and extensive enterprise. Its investigations into the laws of inheritance among mice as well as its work with dairy cattle and poultry have been notable. Beef cattle, swine, and sheep have also been kept at Mount Hope, and inheritance among these animals could have been studied, had not our work with dairy cattle proved to be so controversial that time and effort which might have been given to the improvement of livestock was necessarily diverted to the demonstration of the laws of heredity. Education, however, is a part of the business of Mount Hope, and we have been glad to leave a permanent record of our work, for without a record it would soon have been as though it had never existed. In this article no more will be attempted than to give an outline of the work done at Mount Hope with dairy cattle.

It should be fully understood that there never has been a breed of cattle which could pay its way by sales of the milk and butterfat produced and that dairying is made possible only by the sale of meat—veal and cow beef. Mount Hope believes that a strictly dairy breed of cattle can be made and that by development of such a breed the cost of producing milk will be so lowered that the dairyman's profits will be greater at the same time that the price of milk to the consumer is less. At a time then, when the "purebred" notion dominated American animal industry, Mount Hope taught farmers that the best stock to use for breeding purposes was the stock that produced the best offspring, and that it was neither necessary nor wise for breeders to buy costly registered stock when, by use of the progeny test, they can raise for themselves better animals than any they can get when working by the old standards of type and pedigree.

For the purpose of applying the progeny test to dairy cattle this farm devised and brought into use the Mount Hope Index, which enables dairymen to discover what the productive qualities are that any given dairy bull transmits to his daughters and through his sons and daughters to their offspring. The dairy world has, therefore, begun to judge bulls by their merits and finds that this standard is inconsistent with any other standard. Mount Hope uses the progeny-test method of breeding its poultry and as a result has a flock of 2,000 laying hens whose first-year flock average without culling, when we breed for egg numbers, rises 7 to 9 eggs continuously year after year.

It is due to this teaching that the prestige of the "purebred" idea has been undermined and is approaching its end. All this seems commonplace now. It was not so when Mount Hope began to teach these doctrines. In the beginning they seemed so new and revolutionary that Mount Hope was regarded as a dangerous place. Visitors were reluctant to sign a guest book and sometimes requested that the fact of their visit should not be mentioned.

For those who are interested in the technical side of breeding work, the Mouse House at Mount Hope provides a place for study, and for those who wish to acquire a general idea of modern genetic theory, it furnishes endless interest. Mount Hope, therefore, until the recent war reduced travel,

received thousands of visitors every year and gave to them all a new knowledge of what can be done by modern methods, not only in breeding dairy cattle and poultry but also in breeding beef cattle, sheep, and swine.

Mount Hope is no longer a place where visitors hesitate to sign a guest book. Foreign governments—Germany, Italy, Greece, Bulgaria, Turkey, Sweden and the native Indian state of Bhavnagar—have sent men of authority in their ministries of agriculture to study for six months or a year at Mount Hope. The Massachusetts Department of Agriculture has awarded a gold medal to the farm for its agricultural research. Italy and Bulgaria have given decorations for services rendered by Mount Hope to the agriculture of these countries, and Bulgaria even put the picture of a hen, descended from poultry procured by its government from Mount Hope, on one of its postage stamps. Professors in American colleges come here to study. Classes from agricultural colleges are brought here. The number of persons who visit Mount Hope every year to study its methods has run into thousands and before the war was constantly increasing. Mount Hope publications are used in agricultural colleges, and *Breeding Profitable Dairy Cattle*,[1] the book which describes the Mount Hope Index, is not only used throughout America but has been translated into Japanese for use in Japan. Under these circumstances, a history of Mount Hope will be of interest to many persons.

The farm belongs to Mr. E. Parmalee Prentice of New York, but its establishment, arrangement, and conduct, the purposes which it has sought to achieve, and the methods by which these purposes should be accomplished are the result of study by both Mr. and Mrs. Prentice—of one as much as of the other. Mr. Prentice is a lawyer who practiced in Chicago before going to New York. Mrs. Prentice was born and lived during her early years in Cleveland, and in the eighties and nineties of the last century Cleveland and Chicago were western cities.

In his *History of the Peloponnesian War*, Thucydides referred to the restless energy of the Athenians, of whom it was said that "their only idea of a holiday was to do what the occasion demands." This was also the old American idea of self-respecting conduct, "the strenuous life" which Theodore Roosevelt advocated. In Chicago and Cleveland these old standards lived again. Men worked in "the west" because they were taking part in the building of great enterprises; their work aroused their enthusiasm and idleness was not desired.

Over a century and a quarter ago, William Cobbett said of American workmen:

> . . . our men, who come from England, must not expect, that, in these *common labours* of the country, they are to surpass, or even equal, these "*Yankees*" who, of all men that I ever saw, are the most *active* and the most *hardy*. They skip over a fence like a greyhound. They will catch you a pig in the open field by *racing* him down; and they are afraid of nothing. This was the sort of stuff that filled the *frigates* of Decatur, Hull, and Bainbridge.[2]

The spirit which Cobbett described in speaking of farm labor was, in fact, the spirit of men of all occupations in America, and it continued longest in the parts of the country which longest had the pioneers with them. As Cobbett said in another part of the same book: "Early habits and affections seldom quit us while we have vigour of mind left."

To persons brought up in this outlook upon life, conditions of American life in 1910, both city and country, were unsatisfactory and disturbing. What was needed was greater earnestness, and if it were desired to try to maintain old standards of industry it seemed at first that a beginning might be made with the colleges. For this reason, Mr. Prentice prepared and submitted the Address of the Class of 1885 to the trustees of Amherst College. President Ellsworth G. Lancaster of Olivet College, Michigan, and Dr. William G. Thayer, Headmaster of Saint Mark's School, Southboro, Massachusetts, signed this address with Mr. Prentice as members of the class committee, although neither took any part in preparing the paper.

The address quoted Woodrow Wilson's statement:

> Life, at college, is one thing, the work of the college another, entirely separate and distinct. The life is the field that is left free for athletics not only, but also for every other amusement and diversion. Studies are no part of that life, and there is no competition. Study is the work which interrupts the life, introduces

[1] E. Parmalee Prentice, *Breeding Profitable Dairy Cattle* (Boston, Houghton Mifflin Co., 1935).

[2] William Cobbett, *A Year's Residence in the United States of America*, 324 (London, 1819).

an embarrassing and inconsistent element into it. The faculty has no part in the life; it organizes the interruption, the interference.

Besides this lack of earnestness of which Wilson spoke, the committee believed that the colleges overemphasized scientific at the expense of historical studies. Technical education, so far as government is concerned, teaches devices but not principles which seem to assert that successful business fits for successful statesmanship and proceeds upon the assumption that retrospect is not wise and that in any difficulty we should consider, not how we got there, but how we can get out. It is as if, said Edmund Burke, we should "consult our invention and reject our experience." Here, indeed, is to be found one of the causes of the increasing excitability of American politics. Invention is the parent of utopias, socialism, and radicalism of all kinds. Experience is the parent of improvement, progress, and conservatism.

Amherst was a small college without the equipment for scientific training of its students. It was able, however, to give an introduction to scientific studies at the same time that it placed its chief emphasis upon historical studies and literature. The committee of the Class of 1885 proposed, therefore, that the college should limit its courses to those fields where it could do the best work and that it should seek in these fields the services of the best teachers to be found in the country. To this end and in order to raise the standards of the teaching profession, it should adopt the settled policy of accepting no gifts which involved increased expense but should use all its resources for the indefinite increase of salaries. Furthermore, the committee urged that the college could not devote its whole strength to the elevation of standards and improvement in the quality of work while at the same time it sought to receive increasing numbers. A limitation upon the number of students received was, therefore, necessary if the college was to do the kind of work which the committee described.

The address received much attention throughout the country. In the *Outlook* of February 18, 1911, Theodore Roosevelt said that it was "one of the most noteworthy of recent educational documents" and added:

> If Amherst College is willing and able substantially to adopt the suggestion of the committee, a great good will have been accomplished; and in any event the committee is to be congratulated for having so clearly set forth the principle which it is more essential for America than for any other nation effectually to realize.

As is well known, Amherst regarded the Address of the Class of 1885 with little favor. The effort to introduce more seriousness into college life at Amherst failed. But, perhaps, all things considered, it is better that the attempt should have failed since the time has not even yet come when the colleges are ready for such doctrines, and, in the meanwhile, the subject of American agriculture has slowly come into a position of the greatest national importance, affording a wide opportunity for individual enterprise.

Mr. and Mrs. Prentice, therefore, turned their attention to the improvement of agriculture, and the decision to do this has been justified by the success which Mount Hope has achieved. In a public address in 1940, the president of Williams College said that Mount Hope is "making Williamstown famous the world over"—surely a very kindly judgment, for Williams College, itself, was famous long before Mount Hope was born. "One has to admit," the *Guernsey Weekly Press* said on March 9, 1935, "that Mount Hope has become a world-famous center for scientific cattle."

The first purchase of land at Williamstown for Mount Hope was made in December 1910, a month after the presentation of the address to the trustees of Amherst College, long before any formal reply had been made by the trustees but not before individual trustees had disclosed their opposition to the cause which it urged. An appeal was made to alumni by an article on "The New Opportunity of the Small College" which Mr. Prentice contributed to *Harper's Monthly Magazine* in June 1911, but with little hope of success. The vote of the alumni at commencement that year did not support the address, and their decision was final.

THE MOUNT HOPE DAIRY HERD

Mount Hope is situated in Berkshire County, Massachusetts, about 2 miles south of Williamstown, and extends as far southward as the small settlement now called South Williamstown, but known to previous generations as the South Part.[3] Most of the land composing the farm lies east of the little brook known by the aspiring name

[3] For details on the history of Williamstown and its environs, see Arthur Latham Perry, *Origins in Williamstown* (ed. 2, New York, Charles Scribner's Sons, 1896).

of Green River which, for a considerable distance, forms its western boundary. The great rift in the mountains, known as the Hopper, on the western slopes of Mount Greylock, east of the farm, gives rise to a stream known as the Hopper Brook. This brook with Hopper Valley forms the eastern boundary of most of the farm land, although the Poultry Department and the extensive poultry ranges lie east of Hopper Brook, while the farm office and many of the most important farm buildings are on the Green River Road, west of the river. The principal entrance to Mount Hope, marked by the Lions' Gate, is at the junction of the river and the brook.

From the beginning Mount Hope has had the advantage of having as managers and superintendents, men of great efficiency, good judgment, and energy. Mr. Nelson A. Roberts, a native Yankee, born in Williamstown, has been connected with the farm from the very first and has been manager since 1913. Mr. Norman D. Bottum, another Yankee, but this time from Vermont, had charge of the Poultry Department from 1917 to the fall of 1945 when he gave his place to Mr. Harland Dunn, a younger man who had been his chief assistant for twenty-seven years. Mr. Bottum, however, still retains his interest in our work and has a supervisory responsibility for the department. Mr. H. Arthur Starbuck was assistant manager of the farm from 1923 until he was called into the army as a major of ordnance during the war. Mr. Clifford L. Clevenger became superintendent of livestock in 1927 and still holds this place. All these men are known wherever Mount Hope is known. We do not make many changes in our staff at Mount Hope. All the persons mentioned are friends of the farm owners, and much of the pleasure which the owners derive from the farm comes from associations with them in operating the farm.

The first dairy cattle for Mount Hope were bought in 1916. This was earlier than planned, for our attention was so fully occupied at that time with the construction of necessary buildings, roads, fences, drains, and bridges that we were not yet ready to begin breeding dairy cattle. Nevertheless, milk from tuberculin-tested cattle was needed, so a small but convenient barn was built near the site of the present Stone Barn, and six or eight cows—of no particular breed, but good cows—were bought. During that year occasional use was made of a bull belonging to one of our neighbors, and in June 1917—being of the mind that if we had any bull we should get the best available—we bought of Mr. O. C. Barber of Akron, Ohio, Murne Cowan's Sequel, a son of Murne Cowan, the cow that then held the record for the highest production ever made by any Guernsey cow. With this bull were bought also four Guernsey cows.

It soon appeared, however, that these animals had brought with them a very severe infection of Bang's abortion disease. The herd became unable to reproduce, but our troubles did not end there. In the winter of 1917–18, the cow barn burned so a temporary building had to be erected in its place.

When the United States Department of Agriculture announced the Accredited Herd System, Mount Hope adopted the plan, and its dairy herd has been accredited free from tuberculosis from the beginning. With contagious abortion the problem was not so easy, for neither in 1916 nor for several years thereafter was the disease understood as it is now. The blood test was not at that time generally known, and some authorities believed that the infection was inherited. It was thought, too, by many students of the subject that a sort of natural immunity was possible and desirable. This was long before the days of calfhood vaccination, and Mount Hope, therefore, decided that its best policy was to secure healthy stock and to keep the infection from its herd, a decision which, under the circumstances of the time, general opinion justified. When that decision was made, the only way in which healthy animals could be secured was to investigate closely both the breeding history of every animal whose purchase was considered and the history of the herd to which these animals belonged and thereafter to maintain an elaborate system of quarantine for all cattle purchased.

In 1919, finding that the veterinarians and the colleges which had advised the farm were making no headway, we consulted Dr. Theobald Smith, one of the most brilliant men who had ever dealt with these subjects in this country or in any other. He was at this time the head of the department of comparative pathology in the Rockefeller Institute at Princeton, New Jersey. He advised blood testing every animal in the herd at frequent intervals and discarding all animals that did not pass the test. This advice was followed. The blood samples were examined at Princeton, and after the reactors were disposed of no further trouble from the disease was experienced. Blood testing

at Mount Hope began in 1920, but the requirements relating to health had been so severe that the number of cattle then owned was small, and the herd thereafter grew slowly.

In June 1924, Mount Hope began its efforts to secure in Massachusetts the adoption of a State system of accrediting dairy herds that were free from the disease of contagious abortion, as herds are accredited by the Federal Government free from tuberculosis. At that time no State had adopted such a system, and Mount Hope was anxious that Massachusetts should be the first to begin the fight for elimination of this disease. Massachusetts in 1931 adopted the Mount Hope plan after several other States had taken action for protection against the disease, and Mount Hope's dairy herd was given Massachusetts Certificate Number 1.

In the meanwhile, as methods of avoiding infection were better understood, a number of additions were made to the Mount Hope herd. At this time Mount Hope was interested in Guernsey cattle, and since the reputation of Langwater Farm at North Easton, Massachusetts, stood at the head of Guernsey breeders, Mount Hope bought Langwater Prioress in April 1919 and Langwater Happy Girl in August 1919. At a Langwater sale on May 25, 1922 we bought half a dozen Langwater cows, all these animals having what at that day breeders of Guernsey cattle considered famous pedigrees. In May 1923, eight Guernsey heifers were bought from Beaver Brook Farm at Wilmington, Vermont. These, added to healthy Guernsey cows which had survived the blood test, made, by 1924, a young Guernsey herd which we thought should be good. We needed, however, a good bull. Until this time we had used a son of Murne Cowan and a bull of Langwater ancestry, but neither of these bulls answered our needs. In the summer of 1925, therefore, we sent cows to Farmington, Connecticut, to be bred to Wood Ford's Teddy R, the sire of Anesthesia Faith, the cow that had surpassed Murne Cowan's production record and, therefore, stood at the head of the Guernsey breed. The death of this bull left us with but two of his offspring.

PROGENY TEST BREEDING

The Maine Measure for Proved Sires. On October 20, 1925 Masher's Elsie's May King was chosen to head our herd, partly because of the high production his daughters had shown and partly because he ranked well according to the system of valuing dairy bulls developed by Dr. Raymond Pearl and his associates at the Maine Agricultural Experiment Station, a system based on a comparison of the production records of a bull's mates and of his daughters.[4]

The comparison was made by subtracting the dam's production from the daughter's production. If the latter is more than the former, the sign is plus and the bull is furthering the interests of the breed. If the daughter's production is less than the production of her dam, the sign is minus and the bull is detrimental to the breed. The amount and sign of the summed quantity, therefore, gives the measure of the bull's influence on production. Such a rating as this, it seemed to us at Mount Hope could not be sound for a bull which raises the production of exceptional cows even by a small amount is a very exceptional bull and in many cases better than a bull which raises the production of poor cows by a larger amount.

Unfortunately our new bull, Masher, became impotent, and on March 14, 1926 Noble Regent of Allenwood was bought as his successor, partly because of the high production which his daughters had shown and partly because he ranked high on the test for total butterfat devised by Professor Charles W. Turner of the Missouri College of Agriculture.

The Turner Measure for Proved Sires. The method of appraising a bull's value as a breeder that was devised by Professor Turner was important, for it showed that the ferment which Dr. Pearl had started in Maine was beginning to work in the agricultural colleges. "The science of breeding or genetics," Turner well said, "has as yet contributed comparatively little to the improvement of farm animals," and so he presented some fundamental principles of the new science for the consideration of a world in which "the methods of improvement have been little changed" for centuries.

[4] Raymond Pearl, John W. Gowen, and John Rice Miner, "Studies in Milk Secretion; VII, Transmitting Qualities of Jersey Sires for Milk Yield, Butter-fat Percentage and Butter-fat," Maine Agricultural Experiment Station, *Bulletin 281* (Orono, 1919). See also John W. Gowen and Mildred R. Covell, "Studies in Milk Secretion: XII, Transmitting Qualities of Holstein-Friesian Sires for Milk Yield, Butter-fat Percentage and Butter-fat," Maine Agricultural Experiment Station, *Bulletin 301* (Orono, 1921).

Turner's work was based, however, entirely on the advanced registry records of selected animals, which were given greater weight than could possibly be given to them today, for it is obvious to modern students that selection of favorable data, omitting what is unfavorable, is no sound basis for accurate work. None of the dairy breed associations, however, had adopted herd tests at that time. Cow testing association records were difficult to obtain, and probably were inadequate at the best, so little objection should be made to Turner's use of advanced registry figures except on the general ground that all the agricultural colleges seem to have submitted to the leadership of breed associations instead of coming forward themselves and doing the work for which they existed. Advanced registry figures were provided by the registry associations, and though occasionally criticized unfavorably, nevertheless were accepted by all the colleges. The "purebred" notion in 1925 dwelt in the holy of holies, and the Missouri College of Agriculture and Experiment Station could therefore publish Professor Turner's trilogy of bulletins on the characteristics of Jersey (*Bulletin 206*), Holstein-Friesian (*Bulletin 217*), and Guernsey sires (*Research Bulletin 79*) without the slightest suspicion that both Jerseys and Guernseys were the product of recent matings with Dutch as well as other cattle, and that Dutch cattle were themselves a mixture, the Netherlands having been for cattle the melting pot which it is sometimes said that America has been for the human race. Saint Paul's remark to Titus, "Unto the pure all things are pure," could have no better illustration, and teachers in the agricultural colleges in 1925, as well as not a few officials in the United States Department of Agriculture, were—so far as dairy breed history was concerned—very pure and uncontaminated indeed. The Turner method of appraising a bull's influence is no longer used because it has been found that it overestimated the inheritance which the sire contributed to his offspring. Nevertheless the work was valuable and contributed much to the rising interest in sound breeding methods.

The daughters of our bull, Noble Regent, had been very exceptional, and we used him with entire confidence until we realized that the cows which had been mated to him were also exceptional animals and that, by the Turner method, their effect upon Regent's daughters had been undervalued. Were we misled by a misinterpretation of the progeny test? It was quite conceivable that the daughters of Noble Regent were good, not only because of his influence but also because their dams had contributed as much as the sire to the productive ability of their joint offspring.

The Mount Hope Index. This method of measuring the breeding value of dairy sires is a great step forward since it gives us something never before known—a correct method of determining a bull's breeding worth from his daughters' records after allowance is made for the dams' influence upon the daughters' productivity. For this index and for the advance in dairy cattle breeding thus made possible, we are indebted to Dr. Hubert D. Goodale, the geneticist at Mount Hope. The index was first announced in an article which Dr. Goodale contributed to the *American Naturalist* in 1927 and in the first edition of a pamphlet, *Selecting a Herd Sire*, issued by Mount Hope Farm the same year.[5]

Dr. Goodale, after graduation from Trinity College, Hartford, took the degree of Ph.D. in biology at Columbia University. Thereafter he was engaged in research at the Cold Spring Harbor, Long Island, Experiment Station, until he was made research professor at Massachusetts Agricultural Experiment Station in 1913, a position which he held until he came to Mount Hope in 1922. He has a scientific mind, great resourcefulness, a steady practical judgment, as well as thorough professional training. For our work it is doubtful that his equal could be found. The bull index, however, is only one of Dr. Goodale's many services to American breeders and to our work at Mount Hope.

When the index was first announced in 1927, breeders had so long been accustomed to judge bulls by their type and pedigree that a new doctrine, judging a bull by his progeny, was a complete departure from the accepted notions of the time. Dr. Goodale, however, supported his proposal of index breeding with a reasoned argument based on a mass of statistics whose force has never been denied. No opinion is better than the grounds upon which it is based. It was Dr.

[5] H. D. Goodale, "A Sire's Breeding Index with Special Reference to Milk Production," *American Naturalist*, 61:539–544 (November-December 1927). For a detailed scientific statement on the Mount Hope Index, see H. D. Goodale, "The Theory of the Inheritance of Milk and Butter-fat," in Prentice, *Breeding Profitable Dairy Cattle*, 178–188.

Goodale's demonstration, therefore, which gave strength to the bull-index movement.

Popular ideas of breeding have undergone so great a change in the few years which have elapsed since 1927 that it is not easy now to understand the intensity of the opposition which met the proposal of index breeding when it was first made. It must be remembered, however, that the idea was not only new, but in addition it seemed to question the principles on which great pecuniary investments had been made. Breeders, dealers, auctioneers, employees of the breed associations, and others whose welfare in whole or in part depended upon appraisals made according to the old standards of type and pedigree considered their interests attacked by the new doctrine.

From the beginning, therefore, it was evident that index breeding would meet opposition, and technical accuracy in the statement of the new principles of breeding seemed necessary. Now, in the reproduction of dairy cattle there is a tendency for genes so to combine that the daughters, in quantity of milk production, will be about seven-tenths of the way toward the higher parent, while in butterfat percent they will be about four-tenths of the way toward the higher parent. The rule, then, in the pamphlet for calculating indexes, was based on the fractions seven-tenths for quantity and four-tenths for butterfat percent.

Because this precaution was taken, there was comparatively little criticism directed at the accuracy of the Mount Hope method of figuring and practically no expressed opposition at all to the demand for proved sires. Indeed, the movement to introduce modern methods of breeding which had its origin in this pamphlet met with such general approval that a very competent observer said in a letter published in 1931 that "practically all the Proved Sire Programs in the United States can be traced more or less directly to pioneering efforts at Mount Hope." At the present time this movement has gone so far that it is the generally accepted opinion of the best breeders that successful breeding of dairy cattle can be carried on only by use of proved sires.

The Opposition to the Index. Up to this point, then, the movement for improved breeding methods was rather more successful than might have been expected. It was David Hume's opinion, however, that "The frequent repetition of any idea infixes it in the imagination; but could never possibly of itself produce belief, if that act of the mind was, by the original constitution of our natures, annexed only to a reasoning and comparison of ideas."[6] It was inevitable then that persons whose belief in old breeding methods was most closely connected with the repetition of ideas and least annexed to the process of reasoning should experience resentment when the calm waters of the purebred business were troubled by a new idea. Mount Hope was consequently the object for a time of much hostility from old-line breeders, and with this came also opposition, long and vigorous, to the use of the index, some of which still remains.

At first the opposition was directed principally at what has been called the complicated mathematics of the Mount Hope method and in a smaller degree to the plan of appraising the influence of dairy sires by comparing the production of mates and daughters. To both of these objections, there is a simple answer. Cow keeping can never be an exact science, and for those who find the fractions seven-tenths and four-tenths complicated, the fraction five-tenths is easier and for many purposes just as good. This simplified form of the index, known as the Commercial Form, was, therefore, advocated at Mount Hope as soon as opposition developed to complications in the original formula.

Some mathematics, of course, are inevitable. It being admitted then that progress depends upon the use of proved bulls and that production records of cattle do not furnish the sort of statistics which are capable of supporting conclusions of great biological exactness, breeders must be content with the knowledge that these records are amply sufficient, when properly used, to enable them to tell good bulls from poor bulls and in a general way to discover how good a bull is.

In the past five years, breeders have learned much about the use of biological statistics. Life insurance tables, for example, based upon past averages tell what will be the average expectation of life of a very large number of persons in the future, but they do not give exact results when applied to a small number of cases. Under similar conditions, the average expectation of life of a hundred thousand New England farmers will probably be almost exactly the same in the next ten years as it was in the last ten years. If we limit our observation, however, to fifty or a hun-

[6] "A Treatise of Human Nature; Book I, Of the Understanding," *The Philosophical Works of David Hume*, 1:152–153 (Boston, 1854).

dred farmers the average of these lives may depart somewhat from the average of the tables, and if instead of applying the tables to fifty or a hundred farmers we applied them to half a dozen or a dozen, the departure would be still greater.

Bull indexes are computed by comparing the production records of the daughters and mates of bulls. In order to compare the production of daughters with the production of their dams, and to make comparisons between other cows of different ages, our statistics of milk production since 1936, as stated throughout this article and in all our breeding work, are always in terms of the mature equivalent. The index is then always applied to a comparatively small number of dam-daughter pairs. Moreover, seasons vary; food and management are different in different barns and frequently change in the same barn. The physical condition of the cattle varies, and the result of it all is that though we are able with assurance to tell a good cow from a poor one and in a general way to tell how good a particular cow is, we are never able in measuring production records to tell with scientific precision the productive ability of a particular cow.

The particular fractions then, seven-tenths and four-tenths, to some extent, lose their importance. It is enough for us to know that, on the average, the offspring of dairy cattle are not far from halfway between the parental levels. It is possible, therefore, instead of following the rule first laid down, to simplify the process by using the fraction five-tenths for both milk quantity and butterfat percent. In so doing no change is made in the order in which bulls are ranked, but the work of computation is made easier. By this method of computation,

If the average production of the dams is 8,000 ounds of milk and the daughters' average is 10,000 pounds of milk, the bull is a 12,000-pound bull;

If the average production of the dams is 10,000 pounds of milk and the daughters' average is 8,000 pounds of milk, the bull is a 6,000-pound bull;

If the dams' average butter fat is 4 percent and the daughters' average is 4.5 percent, the bull is a 5-percent bull;

If the dams' average butterfat is 4.5 percent and the daughters' average is 4 percent, the bull is a 3.5-percent bull.

This is the method first known as the Commercial Form of the index and is now called the American Index. It was used in England beginning in 1929 and by the Ministry of Agriculture in British Columbia since 1931. It is used also by the Holstein-Friesian Association of America and the Connecticut Proved Sire Program and is the basis of the index recently adopted by the Ayrshire Breeders' Association. The original form of the index is, however, under some conditions the more accurate. It was this form which was adopted by the English Guernsey Cattle Society, the Suffolk Milk Recording Society, and the Royal Guernsey Agricultural and Horticultural Society.

The Mount Hope Index Abroad. On August 25, 1931, four years after the announcement of the Mount Hope Index, *Hoard's Dairyman* published an article on the subject from an English contributor, Mr. Thomas Scott, of Devon, England. He said:

> It was some two years ago that the writer first became acquainted with the Mount Hope Bull Index and decided to put it to the test and to discover whether it was sense or nonsense. As a preliminary test he interviewed a few well known farmers who willingly lent him all their official milk registers for several years past, and then set to work to find out what was the index of all the bulls which they had used and whether this index was a true reflection of the influence which these bulls had upon the subsequent milk production of the herds. The information thus gained was of astounding interest and satisfied him that this system of estimating the milk-transmitting power of bulls pos sessed great possibilities.

Mr. Scott, therefore, made a survey of the South Devon breed with the object of estimating to what extent the Mount Hope Index could be used in actual practice. In making this survey he discarded the fractions four-tenths and seven-tenths, placing the offspring halfway between their parents as is done in using the Commercial Form of the index. The work was not rapidly done as it takes time to secure accurate statistics, but time and care were given and Scott concluded:

> The all-important factor which emerges from this survey of the South Devon breed is the conclusion that it is possible, by means of the index and milk records, to form a reliable estimate of the probable milk transmitting power of an untried bull, and to make an intelligent selection of those animals which ought to be preserved until they have definitely earned their index.

The Mount Hope Index was also the subject of a contributed article in the London *Times* on October 10, 1932. Mr. Scott's work in Devon as well as

similar work on the English Guernsey cattle was described. The article says in part:

> The greatest asset in any herd is the possession of a suitable bull, an animal which will not only maintain but also improve those qualities which are considered most desirable, whether it be beef, milk, butter fat, or any combination of these. The modern breeder has a far easier task than his ancestors had now that science has come to his aid by devising a system which will augment his personal faculty for selecting the right animal. . . .
>
> The value of this [the Mount Hope] system seems, as yet, to have been hardly grasped by the cattle-breeding industry. But having been tested out and proved it is an asset of the highest commercial importance, particularly in these lean times.
>
> Since the days when pedigree was first recognized as the great advance in systematic breeding, which it undoubtedly was, no such step has been made as is created by this bull index system. . . . Not only from the point of selling his pedigree bulls, but also from the advantage to be gained in improving the standard of his own herd, the man who employs this common-sense method is sure to profit, and whether this profit comes from milk returns or from sales of pedigree stock, or both, he is working on a reliable basis.

When we remember how very sensitive the British have been in regard to any development which might affect their trade in breeding stock, the striking nature of the article becomes apparent. The London *Times*, as might be expected, stands for the reputation of British breeds and breeders, but it was not willing that the index should be left solely to benefit their rivals.

Besides Mr. Scott's article and the article in the London *Times*, there were many others, both in American papers and in papers published abroad, which advocated the use of the index.[7] As an example the *Live Stock Bulletin* of Sydney, Australia, for October 1, 1932, may be quoted. In an editorial entitled "Mount Hope Lights the Way" it said:

> It is not too much to say that the work that has been done at Mount Hope Farm opens up a new era of dairy cattle breeding. The nation that puts this Index to work—that adopts this formula for the purpose of raising the production of its stock—will have great advantages over the other nations that follow the hit-or-miss plan of breeding. The individual who adopts it will eliminate many of his disappointments and may well become a national benefactor. No limit can be placed on the usefulness of this formula. By its aid the production of our dairy farms can be doubled without adding to the number of cows or the number of acres. It provides opportunity for young men with brains to do what no other generation of dairymen has known how to do.

The Campaign of Education. At first and for several years, it was our purpose at Mount Hope to work with and through the several dairy registry associations. They professed a desire to improve their stock, and it was obviously to their interest and the interest of their members so to do. They had prestige and influence, and to procure their willing cooperation, if possible, was clearly our best policy.

Of course the breeding of dairy cattle for improvement of the race would move more rapidly if each breeder, instead of being limited to the use of animals of a certain registry, were free to select the best wherever he could find them without any limitation upon his freedom of action. Fifteen years ago, however, the world was not ready for such advanced doctrine. It was hard for farmers to believe that the best stock to use for breeding purposes was really the stock that had the best offspring. It must also be considered that there were then no such lists of indexed bulls available as there are now, and breeders, to a much greater extent than at present, were dependent upon breed publications for information about the productive abilities of dairy cattle. Mount Hope, therefore, sought to work with the breed associations, contributing articles to their publications, to magazines of general circulation, and to trade journals, and copies of these articles in pamphlet form were widely distributed through the mail. Two large bound volumes of these pamphlets, The Mount Hope Index and Mount Hope Poultry Pamphlets, with three small volumes entitled Mount Hope Breeding Pamphlets are in the Library of Congress, the New York Public Library, the Harvard College Library, and the libraries of Williams and Amherst colleges.

In 1932 a series of conferences was held at

[7] For examples of articles published abroad, see the *Farmer and Stockbreeder* (London), 46:1823 (Aug. 29, 1932); Viscount Lymington, "Old Pedigrees with New Meanings," *The Field* (London), 158:83, 144 (July 18, 25, 1931); Spencer Follett, "Impressions of an American Tour," *Dairy Farmer* (Ipswich, England), 4:13–14, 18 (September 1932); Howard Hobson, "Friesland Deterioration," and "Taking the Gamble out of Dairy Bull Buying," *Farmer's Weekly* (Bloemfontein, South Africa), 42:1244–1245, 1436–1438 (Jan. 13, Feb. 3, 1932); *Natal Mercury* (Durban, South Africa), July 13 and 16, 1935.

Mount Hope with members of the animal husbandry departments of agricultural colleges in New England and New York. No more were invited at a time than could join in a general discussion—perhaps twenty or twenty-five persons. We also had at different times representatives of the breed associations. Although as early as October 1924 Mr. Prentice proposed to the Berkshire Farm Bureau that a county registry be set up on the basis of production and reproduction only, without reference to breeds, we still maintained a Guernsey herd at Mount Hope.

The index has, therefore, been in use at Mount Hope for twenty years. It has been before the public for nineteen years, and during all this time it has been taken up by no agricultural college, nor has it been consistently used by the members of any breed association. This neglect or opposition, whichever it may be, of course has greatly hindered the advance of the movement since dairymen naturally look to the colleges for guidance. When they find that all the colleges and the United States Department of Agriculture still emphasize the necessity of using "purebred" bulls and still follow old type and pedigree methods of breeding, the campaign for new ideas moves slowly and at great expense. It has been possible to create a general demand for "proved sires," but colleges are unwilling to use the word "indexed" since this would involve a recognition of the value of the work done by Mount Hope. Without an index, however, the word "proved" has little, if any, meaning, and so, since ultimately use of the index apparently is inevitable, there is a tendency to use other names for the index and to deny to Mount Hope credit for the changed methods of dairy breeding. Mount Hope, it is said, has brought forward nothing new—all now advanced as novel having long been known!

Perhaps we should see in this comment the second stage through which many reforms have had to pass, being first opposed as too new and radical and then deprecated as unoriginal and commonplace. It is easy to charge that the index is not new since all progress has its roots in the past. Growth is new, not roots, and of growth Alexander von Humboldt said:

> We must, above all, distinguish carefully between an early presentiment of knowledge, and knowledge itself. With the increasing cultivation of the human race, much has passed from the former to the latter, and by this transition the history of discovery has been rendered indistinct. An intellectual and ideal combination of the facts already established often guides almost imperceptibly the course of presage, elevating it as by a power of inspiration. How much has been enounced amongst the Indians and Greeks, and during the middle ages, regarding the connection of natural phenomena, which, at first, either vague, or blended with the most unfounded hypotheses, has, at a subsequent epoch, been confirmed by sure experience, and then been recognised as a scientific truth! The presentient fancy and the vivid activity of spirit which animated Plato, Columbus, and Kepler, must not be disregarded, as if they had effected nothing in the domain of science, or as if they tended, of necessity, to draw the mind from the investigation of the actual.[8]

Now of course "presentiment of knowledge" and "presentient fancy" and "vivid activity of spirit" are admirable, and presentiment of error is wrong and injurious. Moreover the world has long been full of these wrong things. For over 2,500 years fancy ruled while unfounded hypotheses and vivid activity of spirit had their way. Progress began when men began to measure and test, and that marked the birth of modern science. When this was done, a few vivid presentiments were "confirmed by sure experience," but a vast mass of wild imaginings and burdensome superstitions were thrown away, we must hope, forever. It is only when the tests of sure experience have decided what should be saved that we are freed from the reign of mischievous imaginings.

In 1935 Houghton Mifflin Company published Mr. Prentice's book, *Breeding Profitable Dairy Cattle*, of which Mr. Henry A. Wallace, then Secretary of Agriculture, contributed on March 23 a long review to the *Saturday Review of Literature*. The index, Mr. Wallace said, is "an astonishingly simple concept," and while most of the contemporpary breeders have not gone much beyond ancient and medieval worthies in their breeding concepts, some have read in the index the handwriting on the wall and have started its extensive use. On June 16, the *New York Herald-Tribune Books* published a review of the book which said that it was "almost breath-taking" in its scope. It shows that "the ideas and ideals of many breeders today are hopelessly antiquated" and makes the science of genetics available to breeders of dairy cattle. In far-away Bloemfontein, South

[8] Alexander von Humboldt, *Cosmos: A Sketch of a Physical Description of the Universe*, translated from the German by E. C. Otté, 2:467–468 (London, 1849).

Africa, the *Farmer's Weekly*, on May 15, 1935, said that the book is "probably the most remarkable of its kind in the world, and one that cannot fail to become a text-book for all students of animal husbandry." On July 16 the *Natal Mercury* of Durban, South Africa, published a review of the same favorable character. In England and on the Channel Islands reviews were as favorable as in America. Two later books by Mr. Prentice, *American Dairy Cattle* (New York, Harper & Brothers, 1942) and *Food, War and the Future* (New York, Harper & Brothers, 1944), received a similar reception.

THE DEPARTMENT OF AGRICULTURE AND PROGENY TESTING

Although Mount Hope had secured wide popular support and approval, the agricultural colleges and the departments of agriculture, State and Federal, were still unmoved. The first great step toward changing the attitude of dairymen came when Mr. Wallace gave his approval to the progeny test for dairy sires.

In the summer and early autumn of 1935, he held regional meetings to consider the agricultural research program of the Department of Agriculture. These meetings were attended by members of the faculties of agricultural colleges and experiment stations in the region where each meeting was held. Some persons not connected with colleges were also invited. Dr. Goodale, Mr. Clevenger, and Mr. Prentice attended the meeting at Storrs, Connecticut, where the latter spoke on breeding dairy cattle. When called upon to speak, after referring to the fact that both Mr. Wallace and he were natives of the State of Iowa, Mr. Prentice said:

> I am sure that were anyone to ask either Mr. Wallace or me about Iowa we would be willing to say that it is a great State. Neither of us would say that everything coming from Iowa is good; that nothing from Iowa is bad; that whatever may come from other States as compared with the products of Iowa is inferior; and that to mate human beings or animals from Iowa with human beings or animals from any other State would be to contaminate the pure blood of Iowa.
>
> We would not say that, and it would not be true of Iowa or of any other State, or of any country, island, or mainland in the entire world,—unless, indeed, you are speaking of cows from English counties, or from a few other places—and then this unbelievable thing is true, because of course these British cows are what is called "pure-bred."

Now, I have often wondered how these British cattle came to be so pure-bred, and it is probable that at some time almost everybody has speculated upon this perplexing question. At Mount Hope we have the disadvantage that none of us are graduates of an agricultural college and being without this special training, it is hard for us to believe that everything British is superior to anything in America. We are, however, conscious of our ignorance, and I shall not refer to it again. Certainly, in a company of professors who teach the art of pure-bred animal husbandry I shall not attempt to deny what all agricultural colleges know, that excellence among cattle is British—or at least foreign—possible in some cases Dutch or Danish.

It is all the more important then, since this extraordinary condition is to be accepted as really true, that we should know, if we can, how this British, or foreign, superiority arose, and very fortunately I am unexpectedly in a position this morning to satisfy the curiosity which everybody must have in regard to the matter.

My good fortune, I am sorry to say, is wholly a case of luck, not at all of learning, for no amount of study would ever show a scholar why good qualities are inherited by all animals whose ancestors were born in a particular county—say Durham County, England—when good qualities would not be inherited by animals whose ancestors came from a different county—say Dorset or Kent, even though these counties are also in England. It was luck, therefore, that before leaving Mount Hope I received a copy of *Thorntons' Journal*, overseas edition, evidently intended for American consumption, published by John Thornton, Hobson & Co., pedigree live stock exporters of London, England, which contains a brief explanation, "Why British Pedigree Stock is Best."

From this journal, and from other sources, it appears that British stock is best—

1. Because the British people have a natural aptitude which does not belong to persons of other lands and which fits them to breed animals of high quality.
2. Because British breeders have had better training and education in the art of breeding than any breeders in other countries.
3. Because the native stock of the British Isles was originally better than native stock anywhere else.
4. Because foods grown in or brought to Great Britain are better than foods grown in or brought to other lands.
5. "Because the composition of British soil, with its minerals and the varied climatic conditions, is peculiarly suited to the production of strong, healthy stock."

I hope that everybody is well satisfied with that explanation. The British were born with superior brains. To this beginning they added a superior education. How can Americans compete with men having such advantages? It would have seemed more convincing had that last reference to British climate

been omitted, and nevertheless, on further consideration, I am glad that it was not omitted for I am profoundly convinced and sincerely believe that the British climate is as good a ground on which to rest a claim of British superiority as any of the other reasons given.

Admitting then the definite and complete superiority of British stock—which I am sure nobody here will question—and always bearing in mind that American breeders can not pretend to equal British breeders either in native ability or in education, the question still remains, how the Americans can make the most of such material as they have, using all such intelligence as may belong to Americans.

We can approach an answer to this question by making on this blackboard a chart which shall show the producing and reproducing ability of all dairy cattle in America. The chart will be of oblong shape with butter fat per-cent represented on the left perpendicular side beginning with 1 per-cent at the bottom and rising to 10 per-cent at the top. Along the entire upper horizontal margin of the chart will be the figures for milk quantity beginning with 4,000 pounds at the left and going to 40,000 pounds at the right.

Mr. Prentice then explained the principles of Mount Hope methods, illustrating the operations on the chart, and concluded by saying.

There are not many very great animals in any country, but we have our full share of fine breeding stock right here in America and if we seek them out, if we forget all about the story of the pure-bred and the romance of American inferiority, and if we mate together the stock that has the best and highest-producing offspring, we will have the best dairy stock the world has ever known. This is the sort of breeding that we do and teach at Mount Hope.

At the conclusion of this speech Mr. Wallace rose and said that there was a patriotic quality about what had been said which appealed to him and that he would say to the meeting that the United States Department of Agriculture would promote the progeny-test breeding which Mr. Prentice had advocated in his speech.

In 1936 the American Dairy Cattle Club was organized in Illinois for the promotion of index breeding of dairy cattle. Its office is in Chicago where the production of cows belonging to persons associated with the club are recorded and the indexes of bulls are computed—all as described in the club literature.

In 1937, in accordance with the assurance which Mr. Wallace gave to the Storrs meeting, the Department began to issue the invaluable statistics from which can be computed the indexes of bulls used in dairy herd-improvement association herds. The first printed pamphlet, entitled "List of Sires Proved in Dairy Herd Improvement Associations, 1935–37," included the period from 1935 to January 1937, being published in June 1937, as *Miscellaneous Publication 277*. Later bulletins for 1938, through 1945 were issued in the same series and numbered 315, 353, 393, 453, 487, 522, 547, and 563. In November 1940 the Department began to issue its data at shorter intervals in its Dairy Herd Improvement Association Letter, all being assembled, however, in a single pamphlet issued at the end of the year. When the data were published annually, a couple of years might elapse after the statistics had been secured before the value of a bull would be known to breeders. By the system of frequent publications this time is much shortened.

In all these government publications the bulls, listed alphabetically, are divided according to the breeds in which they are registered, the unregistered bulls being put in an unregistered class. No indexes are computed on any bulls in these lists of sires, but figures are given showing the average number of pounds by which the daughters exceed or fail to equal the average of their dams in production of milk and butterfat. It is as though the Department in 1937 had never heard of the index and had adopted the unsound method of rating bulls proposed by Dr. Raymond Pearl and his associates eighteen years before publication of these lists of sires began. This is surely an extraordinary course to follow when the index is in constant and increasing use by dairy cattle breeders. Why the Department alone clings to an old and erroneous method is to many breeders a matter not easily understood.[9]

[9] "And now, reader, as we are in haste to attend our heroine, we will leave to thy sagacity to apply all this to the Boeotian writers, and to those Authors who are their opposites. This thou wilt be abundantly able to perform without our aid. Bestir thyself therefore on this occasion; for though we will always lend thee proper assistance in difficult places, as we do not, like some others, expect thee to use the arts of divination to discover our meaning; yet we shall not indulge thy laziness where nothing but thy own attention is required; for thou art highly mistaken if thou dost imagine that we intended, when we began this great work, to leave thy sagacity nothing to do; or that, without sometimes exercising this talent, thou

The arrangement of these lists is unfortunate also for the further reason that it seems to give the Department's approval to the notion of "pure" breeding of foreign stock and loses an opportunity to educate dairymen in the value of our own native stock and in the great possibilities before them when American cattle are developed by modern methods and index breeding. Moreover, it is practically impossible for dairymen to go through a list of perhaps 1,500 bulls alphabetically arranged and, from the production statistics of mates and daughters given under each bull's name, to compute the indexes which are necessary in order to enable them to select such bulls as would be desirable in their herds.

The American Dairy Cattle Club has followed the Department's publications by its pamphlets entitled, *American Indexes of Sires Proved in Dairy Herd Improvement Associations*. These index pamphlets contain lists of bulls named in the Department's list of sires, giving the American Index of every bull and arranging them all in order of excellence. After the Department adopted the practice of issuing its lists at short intervals in mimeographed form, the American Indexes have been published in the *Herd Builder*, the American Dairy Cattle Club's monthly magazine.

PROGRESS IN THE MOUNT HOPE DAIRY HERD

All careful breeding work is slow. It takes time to make an index for a bull or to judge the breeding value of a cow. With young stock the problem shows in its most difficult form, since it is impossible for a breeder to index many of his bulls, and it is important for him to know, if possible, which ones are the best to select for indexing.

Of course every high-producing cow must eat and digest large quantities of food every day. Seventy-five pounds of milk needs the elements of a great mass of bulky food like hay or grass, silage, and grain. No animal having a wasteful metabolism can ever produce much milk. Index breeding, therefore, which selects bulls by a comparison of productive qualities of mates and daughters and which uses with these bulls the high-producing daughters of other indexed bulls, is, in effect, among other things, breeding for an economical and efficient metabolism. Our best cows are those which make the best use of all their food, and as far as we have yet been able to judge it seems that this course of breeding affects the observable qualities of our young stock.[10] The cows that have the most efficient metabolism were as calves the ones which made the best use of their food.

It is impossible to measure these qualities with great precision for the factor which limits or promotes growth in different calves at different times will not always be the same, but by feeding standard rations and weighing our calves every month we find that the calves from indexed stock which make the cheapest gain per pound of weight during their first twelve months are the ones which make the best use of their food and prove on the average to be the best producers of milk and butterfat.

We have not been able to get the figures on many bulls which would show that the same rule applies to the males, but so far as we have gone it seems probable that our efficiency figures are a sound basis on which to select bulls for indexing. Until the war interrupted our work, we have, therefore, been accustomed to give to each yearling, both to bulls and heifers, an efficiency figure which stated the value we set upon the productive abilities of heifers and upon the abilities of bulls to transmit productive qualities to their offspring.

The subject is one which should interest all breeders of dairy cattle. It demands a thorough investigation, and if it proves with other breeders to give the help which we have thought it gives us, it may in the end, when used as a part of systematic index breeding, do much to put the breeding business on a good commercial foundation.

The original foundation stock for our Guernsey herd at Mount Hope, bought, as already stated, during or prior to the year 1923 consisted of 15 females whose average production was 8,366 pounds of milk—4.95 percent—414 pounds of butterfat. These cows had 74 daughters whose average production was 9,161 pounds of milk—4.78 percent—438 pounds of butterfat. Our great problem was to discover a bull that could raise the very unsatisfactory production of our herd, and while we were studying the use of Wood Ford's Teddy R and Masher's Elsie's May King and the other bulls called to our attention we also considered the production of the daughters of

wilt be able to travel through our pages with any pleasure or profit to thyself." Henry Fielding, *The History of Tom Jones*, bk. 11, ch. 9.

[10] E. Parmalee Prentice, "Looking Ahead with Dairy Calves," *Hoard's Dairyman*, 81:120 (Mar. 10, 1936).

many different Guernsey bulls in herds of which we knew.

Of course the purpose for which a dairyman keeps cattle is to enable him to carry on a profitable dairy business. The cattle must, therefore, be strong healthy animals capable of producing and reproducing profitably. As time passed we were led more and more to doubt that Guernsey cattle met these requirements, and then, studying other herds of registered dairy stock, we doubted that any cattle bred by type and pedigree methods could ever fully meet the dairyman's needs. If registered cattle have not the qualities which go to make a profitable dairy herd—high average production of dams and daughters with steady breeding and normal calving—it is still these qualities that we must have, wherever they come from.

With these ideas in mind, we bought, on December 29, 1926, a cow that the Ayrshire Breeders' Association had made much of—carrying her about the country for exhibition—the well-known Brownie. She was called a grade Ayrshire, but there was no resemblance to Ayrshires in her looks. She weighed 1,225 pounds and was more like the Brown Swiss in color and perhaps in her shape was like a large Jersey with incurving horns. When we bought her she had an advanced registry record of 20,140 pounds of milk—4.42 percent—891 pounds of butterfat. She was then in calf to an Ayrshire bull and in the spring of 1927 gave us a heifer which we called Annie and which grew to be a good cow producing 14,175 pounds of milk—3.89 percent—551 pounds of butterfat. On April 2, 1928 Brownie gave us another heifer. This one we called Blossom, and she proved to be one of our best cows, making two advanced registry records of which the average was 19,142.4 pounds of milk—4.22 percent—807 pounds of butterfat. In 1932 Brownie gave us a third heifer calf, Fanny Fern, that in three lactations averaged 12,645 pounds of milk—4.93 percent—623 pounds of butterfat. These last two daughters of Brownie were sired by Guernsey bulls whose fat index was good but whose index for milk quantity like other Guernsey bulls was low. Meanwhile Brownie herself was a consistent heavy milker. No Guernsey in our barn could compare with her. Looking for other cows to raise our herd average we bought on August 21, 1928 a Holstein cow—May Dekol Francy, whose advanced registry production was 34,448 pounds of milk—3.26 percent—1,123 pounds of butterfat. Francy was always a heavy milker and like Brownie gave us magnificent calves. One of them, Faithful, born January 26, 1932, as a 2-year old produced 19,206 pounds of milk—5.09 percent—977.6 pounds of butterfat. Lashbrook Queen Marie, another Holstein cow, was bought December 10, 1929 and made an advanced registry record of 33,448 pounds of milk—3.3 percent—1,103.8 pounds of butterfat.

We were still interested in our Guernsey herd and hoped to persuade other Guernsey breeders to join with us in an effort to raise the economic qualities of Guernsey cattle. To this end we tested our cows for the advanced registry and occasionally contributed to the *Guernsey Breeders' Journal*. About this time we made an alphabetical list of the indexes of Guernsey bulls computed from advanced registry records of mates and daughters of these bulls. This index list was contained in three large volumes, each bull having a page to himself in which the computation was fully shown. These volumes are still in the farm office at Mount Hope. We also bought a number of Guernsey bulls.

All our Guernsey bulls were, however, more or less disappointing. The average production of Guernsey cows was low, and their susceptibility to breeding trouble was high. Moreover they were always subject to unfavorable comparison with our other cattle—which we had already begun to call American Dairy Cattle—and little by little the poorer cows were eliminated. We never abolished our Guernsey herd or made a decision to cease breeding Guernseys. We disposed of our poor cows on which we were losing money, and the result was that by about June 1941 we had no Guernsey cattle left.

In January 1937, we began to keep all our production records on a dairy herd-improvement association basis. We also ceased to use Guernsey bulls exclusively and for use in our American Dairy Cattle herd bought the following bulls: (1) Prilly Adirondac Veeman, a Holstein bull, October 18, 1935. Index—18 pairs—17,729 pounds of milk—2.96 percent—525 pounds of butterfat. (2) Hays Supreme, another Holstein bull, January 25, 1939. Index—42 pairs—14,236 pounds of milk—3.73 percent—531 pounds of butterfat. (3) Madcap's Victor of Randleigh Farm, a Jersey bull, September 12, 1941. Index—16 pairs—10,563 pounds of milk—5.73 percent—605 pounds of butterfat. All indexes were computed from records made on a dairy herd-improvement association basis and stated in terms of the mature equivalent.

As a result of this policy our herd average of production rose constantly. During 1939, 1940, and 1941, our herd average was 13,398 pounds of milk—4.12 percent—552 pounds of butterfat. These are figures which no Guernsey herd of which we know can equal on a strictly dairy herd-improvement association basis. During the recent war, the Berkshire association, along with others found it impossible to secure testers, and for this reason our official testing was discontinued.

In the management of our American Dairy Cattle herd it has been our practice—until shortage of food and labor during the war compelled drastic reduction in herd numbers—to keep all our heifers through their first lactation, saving thereafter only a few of the best cows for breeding purposes. In this way we were able to make an index on our bulls free from the distorting effect of culling.

During all this time, however, as we used Guernsey bulls on high-producing cows we saw the quantity of our production reduced as the percent of fat increased. When we used Holstein bulls on cows whose butterfat production was high, we saw our fat reduced as milk quantity rose, although the Holstein bulls had it to their credit that they always increased the total butterfat production of our herd. We needed bulls high in butterfat that were not very low in milk quantity and Holstein bulls not too low in butterfat percent.

With our poultry we always raise our own males, for the flock is so large that it is easy to avoid inbreeding. Our dairy herd, however, never contained more than 125 animals, many of them bulls and young stock so that our milking cows rarely exceed at any one time 40 in number. With such small numbers as this we are dependent upon the bulls we can buy, and we constantly see the production of our herd brought down because bought bulls can not keep it up. Were there two or three other breeders interested, competent, and able to do the breeding work we do at Mount Hope, or possibly only one other such breeder, we would see within a short time a race of dairy cattle such as the world never before has known.

At the present time, after the great reduction made during the war, we have left of our herd a small remnant which during 1945 made an average production of 13,534 pounds of milk—4.43 percent—600 pounds of butterfat. All these records had been made on twice-a-day milkings during a lactation period of 305 days while the cows stood in stanchions in winter and were on pasture in summer, receiving feed containing no more than 11 percent protein. It is very difficult to find a bull to use with such a herd as this, but that is the problem we are now facing. At present we know of no Guernsey bull whose butterfat index very closely approaches 600 pounds, and Guernsey bulls whose index exceeds 500 pounds are rare. Occasionally a Jersey can be found with a butterfat index of 600 pounds, but the only Jersey bull as good as this of which we know was our bull that was carried off in the flood of the Green River which made such destruction in Williamstown last year. We have a young American Dairy Cattle bull whose index is 6 pairs—18,817 pounds of milk—4.02 percent—756 pounds of butterfat. Five of the daughter records on which this index is based were made on the farm of a practical dairyman at Whitesville, New York. This—as far as a 6-pair index can be relied upon—is a better index than that of any Holstein bull we ever had—but our bull is too closely related to our cows, and we can not use him at Mount Hope.

This year, with our reduced herd, only two heifers have completed their records. These are Mount Hope Pauline whose production was 15,303 pounds of milk—4.51 percent—690 pounds of butterfat and Mount Hope Phyllis whose production was 15,212 pounds of milk—5.12 percent—779 pounds of butterfat. These records like the records of our 1945 herd already described were made on twice-a-day milkings during a lactation period of 305 days. As compared with advanced registry records they might well be increased by 40 or 50 percent. Then when it is added that both cows stood, like other cows of our herd, in stanchions during winter and during summer were in pasture, and that their feed did not exceed 11 percent of protein, it is clear that to make their records comparable to advanced registry records they should be increased much more than 50 percent Indeed some dairymen would think they should be doubled.

So here is the problem of Mount Hope. With the best dairy cattle in the world standing in our barns we are brought to a standstill because in our herd we can not avoid inbreeding! Two or three farms like Mount Hope, conveniently located and working together could supply American dairymen with truly profitable cattle. The bulls, sold for double the amount which it cost to raise them and no more, would have an endless market, and it would be proved again as it has often been proved in

the past that the most profitable business in the world is the business that gives to its customers greater value than the price they pay.

On the other hand while the American Dairy Cattle Club, now ten years old, continues its slow but steady growth, its younger relative, the American Scientific Breeding Institute, enjoys constantly increasing prosperity. This institute has a farm at Elgin, Illinois, where it keeps a group of high-index bulls for insemination service and has now bought another farm at Madison, Wisconsin. The income from its growing business enables it to keep bulls of the best class while the improvement of herds wherever its business extends and its low charges contribute to its steady expansion. Of course insistence upon breed distinctions which, although decreasing, still prevails among dairymen, delays progress in breeding so far as it requires the mating of animals by color. So far as it promotes the use of heavy stock there is perhaps, in view of the high price of meat, something to be said for it.

The difficulty of procuring the bulls we need is, however, as our business widens, a matter which may become serious, since the artificial insemination business is to a degree self-limiting. The demand which this business makes for high-index bulls always grows, but as farmers rely more and more upon this service they raise fewer and fewer bull calves. Moreover, were farmers to raise all their bull calves there might possibly be hardly 1 in 10,000 capable of earning a 500-pound index. The Institute, therefore, plans to begin pioneer work in the in-ovation of cows at its Elgin farm. It may take a couple of years or more to learn whether the bulls we need can be supplied in this way, but the problem has encouraging aspects, and if the work develops as is hoped the efficiency of the dairy industry will be greatly increased.

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THE RISE OF OFFICIAL STATISTICAL CARTOGRAPHY IN AUSTRIA, PRUSSIA, AND THE UNITED STATES, 1855–1872

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The frontier interpretation of United States history, as expounded by Frederick Jackson Turner and his successors, rests upon census maps showing frontier lines of population as these stood at several moments in our history: 1880, 1870, 1860, 1850, etc. Had there been no census maps of the sort, there would very likely have been no Turner interpretation. The maps on which Turner based his construction thus become objects of genuine interest. Any attempt to understand the problem of the history of the frontier concept in a thoroughgoing way must take account of these maps in and for themselves.[1]

The researcher will do well to give up thinking of these census maps as frontier maps; he will do better to conceive of them as specific examples of statistical cartography. Thus approached, the problem of the maps permits of restatement. It can be put as a question: When and under what circumstances were the techniques of statistical cartography first used in the United States? The present paper aims to provide an answer to this question by adducing certain neglected and some unknown facts, drawn partly from European and partly from American records of statistics and statistical cartography.

The science of statistics emerged first; the techniques of statistical cartography arose afterward and as secondary phenomena when the basic science had been elaborated as a coherent body of knowledge and had attained a stage of maturity and self-consciousness. By the middle of the nineteenth century, statistical science had reached this level.

Bureaus of official statistics to aid governmental policies had been established by this time in France, Prussia, Netherlands, Belgium, Denmark, Norway, Sweden, and other countries of Europe. The governments of these countries published statistical materials of different kinds. Here and there societies of professional statisticians had been formed. The Statistical Society of London, afterward the Royal Statistical Society, was begun in 1834, and

[1] For a preliminary view, see Fulmer Mood, "The Concept of the Frontier, 1871–1898; Comments on a Select List of Source Documents," *Agricultural History*, 19:24–30 (1945).

it published a journal from 1838 onward. The American Statistical Association was organized in 1839.

At the midpoint of the nineteenth century, statisticians became quite overtly self-conscious about their methods, their objectives, and the body of principles which constituted their science. A *privat docent* at the University of Marburg wrote a significant treatise: *Die Statistik als selbständige Wissenschaft: Zur Lösung des Wirrsals in der Theorie und Praxis dieser Wissenschaft.* This work of 175 closely packed pages argued that statistics was an independent discipline, and one of distinct value for researchers in the social sciences. Karl Knies, the author, published his book at Kassel in 1850; he then went on to a distinguished career as a historian.

In 1851 Joseph C. G. Kennedy, the American Superintendent of Census, attended the great exhibition in London. There he met a number of persons interested in statistics, including the celebrated Belgian, Adolphe Quételet; the Britishers, William Farr, Joseph Fletcher, and George Richardson Porter; and the Frenchman, François Pierre Charles Dupin. On official business Kennedy visited the statistical establishments maintained by the British, French, Belgian, and Prussian governments. His purpose was to learn what was going on in this useful field, so that the United States Government could keep abreast of the European pioneering.

Kennedy's voyage, and his round of visits to the several capitals, with the discussions, introductions, and correspondence that ensued, served as a social catalytic agent. The idea of an international meeting of statisticians composed of delegates appointed by governments and scholars called by invitation was born. Quételet, the dean of statistical science, issued the call, and the first International Statistical Congress was held at Brussels, in September 1853. Paris entertained a second congress in 1855, Vienna a third in 1857, and London a fourth in 1860. The fifth congress met at Berlin in 1863 and the sixth at Florence in 1867.[2]

The seventh congress was held at The Hague in September 1869, and at the conclusion of the sessions the usual report of the deliberations was published. Such eminent statisticians of the time as Ernst Engel, Adolf Ficker, Eugène Janssens, Georg Mayr, P. P. Semenov, and Quételet were present, and the records show that these savants interested themselves in discussing, among other topics, the use of graphic methods in statistical work. At the Vienna meeting of 1857 the congress had adopted two resolutions which manifested an interest in this technique, still novel and as yet far from completely developed. The meeting at The Hague took up this topic once more and with an increased interest. An account of the sessions of the subsection charged with the consideration of the matter fills seven printed pages of fine type.[3] Toward the close of the session the subsection adopted two resolutions which may be translated thus:

> The Congress, considering that the graphical method is very suitable for instruction and popularization of statistical knowledge, expresses the wish that important official statistical reports be accompanied by maps and diagrams.
>
> The Congress expresses the wish that the steering committee of the succeeding Congress [that of St. Petersburg, 1872] would undertake to have prepared a memoir on the different graphical methods used in statistical work and on the means suitable for making tables that are uniform and comparable with each other.

Samuel Brown, president of the Institute of Actuaries of London, was present at The Hague congress as one of the official delegates representing the Royal Statistical Society of London. He prepared a detailed account of the work of the meeting at The Hague, which he read before the society in London on December 21, 1869. The following excerpt relating to the use of the graphic method is taken from it:

> The comparison of statistics by curves, diagrams, and charts, whether coloured or not, has been extensively used in some branches, especially in those relating to health and mortality, density of population, education, crime, fluctuations of rates of interest, and prices of the funds, of corn, in meteorology, railways and canals, &c. But no general principles are settled by which the same forms should be used for the same class of events, nor as to specific colours, nor scales or propor-

[2] For summaries of the proceedings of these congresses, see International Statistical Congress, *Compte-rendu général des travaux du congrès international de statistique aux sessions . . . 1853 . . . 1869* (St.-Pétersbourg, 1872). There are also separate reports covering the proceedings of each congress.

[3] For the resolutions of 1857 and 1869, see *ibid.*, 3. On the sessions of the subsection, see International Statistical Congress, *Congrès international de statistique à La Haye; Septième session du 6 au 11 septembre 1869*, 2:64–71 (La Haye, 1870).

tions of space; especially is there no connection between what is in common use in one country when compared with another. Very much remains to be done to obtain any degree of uniformity. But there can be no doubt that the laws of occurrence may be much better seen, and principles developed by making visible to the eye, by curves and diagrams, the deviations of any set of observations from the average results. The valuable papers . . . in the reports of previous Congresses . . . are alluded to by M. Obreen, who wrote this interesting part of the programme. The Section came to a resolution, after a lively discussion, that it is very desirable that the principal official statistical documents should be illustrated by charts and diagrams.

A proposal of Dr. Engel was also carried, that the Organisation Commission of the next Congress should prepare a memoir on the different graphical methods hitherto employed, and the best way of rendering them uniform and suitable for comparison with each other.[4]

Since Brown thought it necessary to explain to professional statisticians so precisely the problems and opportunities in the field of graphical methods, it is apparent that the subject was not yet devoid of an element of novelty.

An American delegate, Samuel B. Ruggles of New York City, also prepared a report on the meeting of The Hague congress. Completed in April 1870, and received in June of the same year by the Secretary of State, it was ordered to be printed as part of a congressional document the following March. This able report, "Internationality and International Congresses," describes with a fair degree of fullness and a generous documentation the results of the deliberations at The Hague and includes the French verbatim text of the several resolutions of the five sections of the assembly.[5] In this way the resolutions on "La Méthode Graphique" were brought to the attention of such hardy American readers as had stomach for digesting information lodged in public documents. Though inconspicuously published and briefly discussed by a non-statistician, an official report on the existence of the technique was at last publicly available in the United States.

Before turning to the details which outline the evolution and development of the rise of the techniques of statistics known as statistical cartography, it may be helpful to define statistical cartography and to explain its relations to statistical tabulation. To this end it has seemed preferable to use the explanations of a classical rather than a contemporary writer on the subject. The excerpts which follow are from *Geschichte, Theorie und Technik der Statistik* (Berlin, 1886), the work by the eminent statistician, August Meitzen, which long held rank as a leading manual on the subject.[6]

> The strictly logical character of statistical investigation permits the presentation of statistics in an admirably clear and simple form. . . . This gives rise to tabulation and graphical representation.
>
> The tabular presentation gives a complete account of the entire process by giving concisely the results of each step. . . . The tabular system is best applied when the horizontal lines are devoted to the aggregates, the vertical columns to the various units. The various aggregates are named at the beginning of the line, the units at the head of the column. . . .
>
> Graphical presentation is a modification of the idea underlying the tables. It uses geometrical instead of numerical methods. It often shows the results in their geographical distribution instead of merely naming the sections as in a table. The object is to gain greater clearness and simplify the drawing of conclusions.

Meitzen recognized six types of graphical representation: Diagrams, hexagrams, chronograms, chorograms, cartograms, and solids, or models in three dimensions. Of the six types, we are most concerned with his cartograms. This type he defined thus:

> Cartograms are representations in which the geographical map shows the totals or the ratios of the different units by various inserted diagrams and hexagrams. The diagrams may here show a certain number of distinctions, but the limit is soon reached.

Developments in Austrian statistics have interest for the present discussion. In 1840 an independent imperial directorate of administrative statistics was created; five years afterward publication of selected portions of the returns was permitted. In 1846 the *Tafeln zur Statistik der oesterreichischen Monarchie für 1842* appeared, and these were followed by four other works down to 1853. In 1848 the statistical work was transferred to the ministry of trade, which began in the following year to publish a new series of tables on the population,

[4] Royal Statistical Society, *Journal*, 32:399–400 (London, 1869).

[5] 42 Congress, 1 Session, *Senate Executive Document 7* (Washington, 1871, serial 1466). For Ruggles' report, see *ibid.*, 10–54.

[6] August Meitzen, "History, Theory, and Technique of Statistics . . .," translated, with an introduction, by Roland P. Falkner, in the American Academy of Political and Social Science, *Annals Supplement*, March, May 1891, p. 194–196.

area, administration, and cultural characteristics of the monarchy.[7]

Karl Czoernig von Czernhausen (1804–1889), a government official and statistician of note, held one post or another in the Austrian government from 1828 to 1865. In 1841 he became chief of administrative statistics in the ministry of finance and later held other important statistical posts of an administrative character. Czoernig won European repute as a statistician of capacity. His official and individual contributions to scholarship in the field were valuable. The general problem that long held Czoernig's attention was the preparation of a comprehensive account of the history and current status of the many national groups that then resided within the borders of the empire. His monumental work, *Ethnographie der oesterreichischen Monarchie* (Stuttgart, Wien, 1857–1858), was issued as an official publication of the office of administrative statistics. However, it is the map that Czoernig prepared to accompany this work that is considered the most important of all his contributions.[8]

This map ranks as the first production of major importance in the field of statistical cartography. In manuscript form it was displayed at the Brussels meeting of the International Statistical Congress in 1853. It was published under government auspices at Vienna in 1855 with the title, *Ethnographische Karte der oesterreichischen Monarchie.*[9] The map consists of four large plates, each measuring approximately 28 inches in width by 20 inches in height. These plates, fitted together in proper order, provide a complete view of the far-flung dominions of the Austrian empire in the early 1850s. The subtitle of this work appears on the fourth plate: "Bevoelkerung der oesterreichischen Monarchie nach Sprachstämmen abgetheilt. Zählung des Jahres 1851."

The basis of the map is both topographic (mountain ranges, river systems, coast lines, etc.) and cultural (cities, towns, political boundaries of provinces, etc.). On these data a system of colors is superimposed to indicate the location of the several *Sprachstämmen* resident within the imperial boundaries. With the aid of this well-employed chromatic device the student using the map can see at once the Czechish enclaves surrounded by Germans, for one example, or the Italian advanced settlements on the south Tirolian border, for another, etc.

In this instance, Czoernig as mapmaker had a large political territory to work with; he had also many complicated linguistic problems to resolve. A thorough worker, he was satisfied with nothing less than a complete roster of all the language groups under the emperor's rule. He specifically nominated seventeen of them. Thus the numerically sparse population of the *Ladiner* is as faithfully attended to as the numerically great population of the *Magyaren*. His list, complete, reads: *Deutschen, Cechen, Slovaken, Polen, Ruthenen, Slovenen, Serben, Kroaten, Bulgaren, Italiäner, Friauler, Ladiner, Walachen, Moldauer, Magyaren, Albanesen,* and *Armenier*. The several areas held by majorities of these groups are clearly, indeed even minutely, shown, as are the "Monarchie- und Kronlandsgrenze."

When it is understood that the chromatic scheme of this map required the utilization of thirteen different colors in addition to white and that the computations underlying the map work entailed handling statistical data for every single local unit in the extensive empire, it will be seen that, over and above the tasks of engraving and printing, this cartographical production represents a tremendous feat of organized and purposeful activity, coming to a climax in a work at once scientifically striking and esthetically satisfying. Little wonder, then, that its creation is said to have taken thirteen years.

This magnificent map was not the sole demonstration, however, of the possibilities of statistical cartography that Czoernig gave to the world. In 1862 he published *Das oesterreichische Budget für 1862: In Vergleichung mit jenen der vorzüglichenen anderen europäischen Staaten.* The two volumes of this work contain a series of maps showing the geographical distribution of industries throughout the empire. Still another work by Czoernig of interest in the present connection is *Das Land Görz und Gradisca (mit Einschluss von Aquileja): Geographisch-statistisch-historisch dargestellt* (Wien, 1873). This monograph in two volumes also includes maps demonstrating the possibilities of the technique of statistical cartography.

Up through the middle 1860s, the Austrians led Europe in the preparation and construction of refined examples of statistical cartography. But

[7] *Ibid.*, 62–63.

[8] For a sketch of Czoernig's life and contributions, see Karl Pribram in the *Encyclopaedia of the Social Sciences*, 4:688–689 (New York, 1931).

[9] The copy in the Library of Congress was used in the present study.

Austria did not permanently retain the lead which the talents of Czoernig had won for her. The Prussians now came forward and assumed a prominent place in the progressive development of the emerging technique.

The rise of statistical cartography in Prussia must be viewed in relation to the prior growth of the Prussian statistical office and the statistical collections and publications which it issued. The office was established at Berlin in 1805.[10] Johann Gottfried Hoffmann (1765–1847) directed the agency from 1810 until his retirement in 1834. A student of Hoffmann, Karl Friedrich Wilhelm Dieterici (1790–1859), became director in 1844. His policies included wide dissemination of the statistical materials collected and analyzed by his staff. In 1849 he commenced publication of the *Mittheilungen des statistischen Bureaus*, a series which was terminated in 1860. Another statistical venture was a monographic series, *Die Tabellen und amtliche Nachrichten über den preussischen Staat*, that set forth meteorological, economic, social, religious, educational, and population statistics. The volumes were published for the bureau at Berlin between 1849 and 1858.

Christian Lorenz Ernst Engel (1821–1896), a leading statistician of the day and director of the statistical office of Saxony, was imported to succeed Dieterici. Engel held office till 1882. He was a convinced publishing statistician and, once settled in his new responsibility, proceeded to reshape old publications and initiate new ones. He ended the file of the *Mittheilungen* but continued the issuance of its contents by establishing the *Zeitschrift des Königlich preussischen statistischen Bureaus*, which began in 1860. At the same time he instituted a new organ, *Preussische Statistik* (*Amtliches Quellenwerk*), which began as a numbered series at Berlin in 1861. A third series was begun in 1863 when the first volume of the *Jahrbuch für die amtliche statistik des preussischen Staates* was issued.

The previous year Engel founded the first German seminar of statistics. It was a bureau agency, but he opened its opportunities to qualified students from the University of Berlin.[11] In the July 1865 issue of the *Zeitschrift*, an announcement listed seven subjects for the seminar lectures of the coming year. A year later a similar announcement referred to nine principal subjects among which were "Topographie und Kartographie, mit besonderer Berücksichtigung des Preussischen Staats."[12] From this it may be seen that the Berlin statistical theorists were nearing, if indeed they had not already reached, the study of statistical cartography. But this was more than a decade after Czoernig had demonstrated what the methods of statistical cartography could produce. Up to and through the year 1869 the inquisitive searcher who laboriously turns the multitudinous pages of the bound volumes in the Prussian series of *Mittheilungen*, *Tabellen*, *Zeitschriften*, *Jahrbücher*, and *Preusssische Statistik* will find no statistical illustration of any sort whatsoever.

The years 1862–1869 must have been the years when Engel and his staff were mastering the new skills and methods. Of what was going on in their atelier during this time, they gave but scanty published indications. Suddenly, however, they demonstrated their abilities. The proof appeared in 1869 when Meitzen's maps which depicted statistical data cartographically were issued in connection with the first, second, and fourth volumes of his now classic work, *Der Boden und die landwirthschaftlichen Verhältnisse des preussischen Staates* (Berlin, 1868–1871). The atlas and monographic set were official publications of the Prussian government.

August Meitzen (1822–1910) was born in Breslau. Influenced by Wilhelm Wattenbach, Meitzen undertook the investigation of the agricultural history and statistics of Germany. From 1853 to 1856 he served as burgomaster of Hirschberg, and from 1861 to 1865 as a commissioner of the *Grundsteuerregulierung*, being stationed at Breslau. Summoned to Berlin in the latter year for service

[10] Originally the agency was known as the Preussisches Statistisches Bureau, but in 1905 its name was changed to Statistisches Landesamt. On the history of the bureau, see its *Die geschichtliche Entwickelung der amtlichen Statistik des preussischen Staates*, von Richard Boeckh (Berlin, 1863); and *Festschrift des königlich preussischen statistischen Bureaus zur Jahrhundertfeier seines Bestehens, Erster Teil, Das königliche statistische Bureau im ersten Jahrhundert seines Bestehens 1805 bis 1905* (Berlin, 1905). For short biographical accounts of Dieterici, Engel, and Hoffmann, see the *Encyclopaedia of the Social Sciences*, 5:138, 539, 7:398–399 (New York, 1931, 1932).

[11] In 1879 the American, Richard T. Ely, became a member of the bureau, attended the seminar, and heard lectures by Engel and Adolf Wagner. According to his *Ground under Our Feel: An Autobiography*, 51 (New York, 1938), Ely "received a good training in method from Engel's lectures. . . ."

[12] Preussisches Statistisches Bureau, *Zeitschrift*, 5:165 (Berlin, 1865), 6:161 (1866).

in the *Grundsteuerveranlagung*, he shortly afterward became associated with the Prussian statistical office and acquired an increasing reputation in his field as an official of high intellectual powers.

Meitzen's scholarly abilities had already been demonstrated before coming to the capital by the publication of his *Urkunden schlesischer Dörfer, zur Geschichte der ländlichen Verhältnisse und der Flureintheilung insbesondere* (Breslau, 1863) and *Die Kulturzustände der Slawen vor der deutschen Kolonisation* (Breslau, 1864).[13] In 1869 and afterward, he gave instruction in the Berlin statistical seminar. In 1872 he began service in the statistical bureau of the newly established empire. From 1875 onward he also served as a professor in the University of Berlin. His *Geschichte, Theorie und Technik der Statistik* was first published in 1886.

The background to Meitzen's famous work on the land and agricultural characteristics of Prussia may be briefly sketched. In 1861 a finance commission, investigating the regulations of the land tax, made its report.[14] Having been summoned to Berlin for service with the Prussian central administration, Meitzen was commissioned in 1865 by the ministers of finance and agriculture to prepare a comprehensive survey of land utilization in Prussia and the system of agricultural taxation then in force. This work was based on existing official records, particularly the results of the cadastral survey made in accordance with the land tax legislation of 1861.[15]

For the present study it is Meitzen's atlas that is of prime interest. Bibliographically speaking, this atlas occurs in various forms.[16] In its familiar state it consists of a table of contents and twenty plates in colors. A brief survey of these plates is now presented.

Plate 1 displays the area of Prussia according to the political divisions of its several provinces. The boundary lines are shown in red. The historical development of Prussian territory is shown by the use of blue color in several different shades. The original area of the Brandenburg Mark is indicated

[13] *Meyers Grosses Konversations-Lexikon*, 13:563–564 (Leipzig, Wien, 1909); *Festschrift des königlich preussischen statistischen Bureaus*, 1:259, 263; and *La Grande Encyclopédie*, 23:584 (Paris, n.d.).

[14] See Finanz-Kommission über die Regulierung der Grundsteuer, *Berichte der verstärkten Finanz-Kommission über Gesetz-Entwürfe betreffend die Regelung der Grundsteuer* (Berlin, 1861); and Finanzministerium *Gebäudesteuerveranlagung: Denkschrift über die Veranlagung der durch das Gesetz vom 21. Mai 1861 eingeführten allgemeinen Gebäudesteuer auf dem platten Lande und deren seitherige Ergebnisse* (Berlin, 1864).

[15] *Encyclopaedia of the Social Sciences*, 10:302 (New York, 1935).

[16] The title page of the usual form reads: *Der Boden und die landwirthschaftlichen Verhältnisse des preussischen Staates.* Im Auftrage des Kgl. Ministeriums der Finanzen und des Kgl. Ministeriums für Landwirthschaft, Domainen und Forsten dargestellt von August Meitzen, Dr. phil., K. Regierungsrath. Zwanzig Karten zur ersten Abtheilung (Band I bis IV). Berlin. Verlag von Paul Parey. Verlagshandlung für Landwirtschaft, Gartenbau und Forstwesen. SW., 10 Hedemannstrasse. (1871.) The Inhalts-Verzeichniss (Contents) is a double-page spread. The atlas is identified as "20 chromolith. Taf. in Fol." by C. G. Kayser, *Vollständiges Bücher-Lexikon*, 20: 108 (Leipzig, 1877). See also *Catalogue générale des livres imprimés de la Bibliothèque Nationale: Autheurs*, 111: 780 (Paris, 1931). The copy that I used has stout board covers of pale yellow color, stamped with cover title identical with the legend on the title page. The outside measurements of the volume are 25.5 by 37.5 centimeters, and the double plates measure 50.5 by 37.5 centimeters. There are probably variants of these details, depending on the circumstances of the binding.

An earlier form of the atlas was apparently available in time for the inspection of the delegates at the International Statistical Congress at The Hague in September 1869. Everett E. Edwards and Mrs. Helen E. Hart have called my attention to the section entitled "Cartes, Diagrammes, Publications Statistiques Offertes au Congrès" in the International Statistical Congress, *Congrès international de statistique à La Haye . . . 1869*, 3:94–122, which lists on page 115 under the caption "Prusse" the following item: "Aug. Meitzen. Der Boden und die landwirthschaftlichen Verhältnisse des Preussischen Staates nach dem Gebietsumfange vor 1866, Berlin 1869 (Atlas en 12 feuilles)." Edwards has also noted that the second volume of the text of Meitzen's work which was published in 1869 has a *Benachrichtigung* tipped in the front which includes the following notation: "Vom Atlas wird gegenwärtig die erste Lieferung von 12 Karten ausgegeben, die Ausgabe der zweiten (Schlusslieferung) von 8 Karten erfolgt mit dem III. Bande, der bereits im Druck ist." The title page of Meitzen's third volume of text, published in 1871, carries the notation, "Dritter Band nebst einem vierten Bande, Anlagen, und einem Atlas von 20 Tafeln."

The plates of the atlas were also issued and distributed separately. See footnote 19.

I take this opportunity to thank my colleagues, C. O. Sauer and S. V. Ciriacy-Wantrup, for helpful opportunities to discuss several problems arising from the study of this atlas.

by deep blue, later additions for the period 1442–1618 by a slightly lighter shade, the additions of 1648–1720 by a still lighter shade, and so on. Thus, with but a little study, the eye can fix upon the essential elements, temporally or spatially, of Prussian political geography.[17]

Plate 2 is a topographic map of Prussia which shows five degrees of elevation by colors. Districts less than 80 feet above sea level are apple green in color; districts more than 80 feet but less than 200 feet are pale green, and so forth.

Plate 3 shows the geological formations of Prussia according to a scheme of more than twenty individually indicated elements. The color scheme employed is beautifully chromatic and reveals at a glance the basic relationships.

Plate 4 displays seven chief soil types of the Prussian lands. These are clearly indicated by colors, etc., on the map, thus: Chalk and marl deposits, favorable loam and clay soils of the higher elevated plains, loam and clay soils of the river lowlands, unprofitable loam and clay soils of mountain areas, loamy sand and sandy loam, sandy, and moor.

Plate 5 indicates the average temperatures of the months of March, April, and May, according to the Reaumur scale, in eight gradations. The use of colors makes it at once clear which are the relatively warmer and the relatively cooler districts of Prussia. The locations of beet-sugar factories are indicated by conspicuous red six-pointed stars. The districts measureably devoted to viticulture are shown by hachures of red lines in two degrees of density for *schwach* and *stark*. This technique brings out in fairly bold relief a zone in the Rheinland extending from Bonn to Mainz and linked with a zone about Speier. Even more prominently in relief is the narrow sinuous valley of the Mosel. Other wine-growing districts also stand out clearly. Beet-sugar factories are shown to have concentration in the region of Magdeburg and the area to the south. These form lesser centers in the regions about Cologne, Breslau, etc. This plate is instructive, and the data themselves, as well as the varieties of relationships existing between them, can be readily perceived by the studious eye.

Plate 6 (Der preussische Staat, nach dem Verhältniss der Einwohnerzahl in den einzelnen Kreisen) has peculiar relevance for the present study. It is the immediate European prototype for the population maps in the reports of the United States census of 1870. Plate 6 exhibits in eleven degrees of gradation the distribution and density of the Prussian inhabitants by local districts (*Kreisen*). The color scheme of the plate ranges in intensity from blackish brown to pale yellow-brown. The degrees of density in the order of decreasing magnitude are: 20,000 inhabitants and above; 12,000 to 20,000; 8,000 to 12,000; 6,000 to 8,000; 5,000 to 6,000; 4,000 to 5,000; 3,500 to 4,000; 3,000 to 3,500; 2,500 to 3,000; 2,000 to 2,500; and under 2,000.

This endlessly suggestive map strikingly displays the very considerable difference in population density between the several districts of Prussia at the time. The eye at once takes note of such particular urban conglomerations as Münster, Magdeburg, Potsdam, Berlin, Stettin, Posen, Breslau, Trier, Coblenz, etc. The densely settled industrialized region north and northwest of Cologne extending from Düsseldorf to Essen and beyond, stands out clearly, as do the thickly populated areas south of Magdeburg and surrounding Halle. The comparatively empty area that stretched southwest of Danzig also stands out sharply. This map represents a noble triumph for statistical cartography.

Plate 7 is another such. It exhibits the several different religious and linguistic groups of Prussia in terms of their areal distribution and density. Altogether, this map displays great ingenuity in construction. It shows simultaneously several different categories of data. In eleven shades of blue, the cartographer indicated the distribution areally and the relative percentages of the Prussian population that adhered to the Roman Catholic faith. The Roman Catholic zones are sharply visible to the eye: The Rheinland, a belt comprehending Münster, Paderborn, and Arnsberg in west Germany; and a more extensive zone extending broadly from Danzig southward along the line of Bromberg, Posen, Liegnitz, Breslau, and Oppeln. Between these two principal zones of high Catholic density lies the zone of north German Protestantism. The districts which speak Slavic, Lithuanian, or Walloon are indicated by red lines. Six-pointed black stars fix the locations of higher agricultural colleges.

The remainder of the plates in the atlas must be passed over more rapidly. The eighth shows the areas with landed property not assessed for land tax; the ninth, the net returns from the land tax by local districts; the tenth, the cultivated areas by local districts; the eleventh, the tax net-return

[17] Plate 1 carries in the lower left corner the note, "Entworfen und gezeichnet von H. Kiepert"; Plates 2–4 and 6 "Zeichnung von H. Kiepert."

per morgen of the cultivated areas by local districts; the twelfth, the percentage of the total area in meadow and pasture; the thirteenth, the proportion of average land-tax net-return from meadow and pasture; the fourteenth, the forest areas in nine gradations; the fifteenth, the proportion of land-tax net-return per morgen for forested land; the sixteenth, the number of horses per geographical square mile; the seventeenth, the same for beef cattle; the eighteenth, the same for sheep; the nineteenth, the distribution of large landholdings; and the twentieth, the distribution of returns per capita from certain taxes.

The maps of Meitzen's atlas thus strikingly and variously revealed the amazing capacity of the technique of statistical cartography to exhibit different orders of facts—meteorological, geological, territorial, populational, economic, religious, fiscal, etc.—and to exhibit the many relationships that existed between different categories of facts. This work was not a triumph; it was a series, a plurality, of triumphs.

It will now be shown how Meitzen's maps found their way to the United States. In the fall of 1869 an official (Dr. Flügel) of the Prussian ministry of the interior caused to be boxed and shipped to Washington, Meitzen's volumes 2 and 4, and a and a number, not specified, of the plates of the first fascicle of the atlas. These were sent as exchanges to the Smithsonian Institution, which received and accessioned them (accession numbers 64,366 and 64,367) on December 17, 1869.[18] The second volume was marked with the oval stamp of the Institution on the title page; within the oval is the Institution's accession number, 64,366. On page 340, the last printed page in volume 2, the date December 17, 1869 has been mechanically impressed in ink. The atlas plate 18, the outermost plate in the fascicle, was also marked by the same stamped impression and on the same date. Soon thereafter, the atlas plates and the volumes were sent on deposit to the Library of Congress, where, in the course of processing the books, book plates were affixed to the covers of the volumes indicating that these books were regarded as part of the Smithsonian Deposit. In the following year, they were noted in the *Catalogue of Books Added to the Library of Congress, from December 1, 1868 to December 1, 1869* (Washington, Government Printing Office, 1870). This work lists Meitzen's volumes 1, 2, and 4 as included in the collection, and though it does not indicate the presence of the maps, yet we can be certain that they were there then, because, as we have seen, they were received with the volumes by the Smithsonian Institution, dated by the identical device, and on the same date as the second volume which is now in the Library of Congress. This point of chronology is important, because the early arrival of the Meitzen plates in Washington made it possible for the officials of the Ninth Census to use them as models for their own cartographic purposes.[19]

By about 1870 the leading statisticians in the United States had awakened to the truth that graphical representations based upon statistical data both pleased and instructed the general reader, who, unless he was a being of an unnatural hardiness, shrank from perusing columns and columns of figures or stern serried rows of statistical tabulations. And thus far no United States census volume before 1854 had carried a map of any kind whatsoever, statistical or otherwise. In that year Superintendent James D. B. De Bow in his *Statistical View of the United States* made place for a small crude map with the heading "United States—1854." This simple affair with line shadings showing the four great drainage basins of the country is the very

[18] Mrs. Elisabeth H. Gazin, associate librarian, Smithsonian Institution, Washington, kindly checked the Smithsonian accession records for me in December 1943.

[19] In 1943 I examined separate plates 1, 2, 4, 6, 7, 9, 10, 14, 15, 16, 17, and 18 that were filed with the four volumes of text and tables of Meitzen's work at the Library of Congress. In their unbound (and presumably untrimmed) state they measure 53.5 by 41.5 centimeters. Plate 18, stamped with the date Dec. 17, 1869, was soiled with the dust of years, having been used as the cover for the other plates which were folded lengthwise inside it. The number of maps in this group corresponds with the number specified for the Meitzen atlas noted in the report of The Hague Congress. See footnote 16 above.

The Smithsonian Institution also acquired plates 3, 5, 8, 11, 12, 13, 19, and 20, presumably from the Prussian ministry. Plate 20 bears the date July 17, 1873 mechanically impressed in ink. This group of maps was transferred to the Library of Congress on July 29, 1926 and filed in its map division. In 1946 Mrs. Helen E. Hart and Everett E. Edwards called attention to the fact that the maps of this group, together with those listed in the preceding paragraph, constitute all the maps in the Meitzen atlas. In consequence the map division of the Library of Congress has assembled a complete set of the unbound maps as an atlas.

first map in any census publication of the United States Government.

As already noted, Joseph C. G. Kennedy, predecessor of De Bow in directing the work of the Seventh Census and his successor in heading the Eighth Census, alertly maintained contacts with some of the leading statisticians in western Europe. There can be little doubt that he knew pretty well what was happening beyond the Atlantic in the developing field of graphical representation. Nothing of the sort appears in the reports of the Eighth Census, however, but this proves only that he did not publish such maps or diagrams in this work. That statistical maps were made by Kennedy some time before 1866 seems plausible, although no proof has been offered that they were constructed as parts of a census project or that they were published for general use.

It is Francis A. Walker (1840–1897), Superintendent of the Ninth Census, who must receive the credit for making use of the new technique and applying it in the census reports of 1870. Of this innovation, the historian of the census, and, incidentally a friend and admirer of Walker, said:

> Maps and charts were employed, for the first time in the census, as a means of presenting graphically the highly interesting results and conclusions reached at the ninth census period, pertaining to the density of the population; the distribution of the colored and foreign elements, and of the natives of certain specified foreign countries; illiteracy; wealth; the range and degree of prevalence of certain diseases; range and degree of cultivation of leading agricultural products; physical characteristics of the country; and the acquisition and transfer of territory from 1780 to 1870, with a chapter of historical notes respecting the acquisition of the territory of the United States, the erection of existing and obsolete political divisions, and their successive changes in organization and area.[20]

The listing of what Walker accomplished by the use of the techniques of graphical representation is full enough to earn the honest admiration of even a chance reader of the quoted paragraph, but admiration for an ample accomplishment need not blind the critical reader to the truth that it was not Walker who invented these methods of which he made such good and serviceable use. The official history of the census does not tell who fathered the techniques; it is perhaps doubtful whether the author knew. Nowhere did Walker himself tell, and it is a certainty that he did know. This reluctance to acknowledge a professional obligation is the sole obvious blot on an otherwise stainless New England escutcheon.

On February 7, 1870, Walker began his noteworthy service as Superintendent of the Ninth Census. The enumeration of inhabitants commenced on June 1, 1870 and was substantially completed by the end of the year; the entire work of enumeration was finished on August 23, 1871. Although this census was taken under the law of 1850, several modifications were made in the schedules used.[21]

On September 2, 1871, just 10 days after the final enumeration had been made, the first fruits of the Ninth Census became public property. On that date 1,000 copies of the first four tables were obtained from the printer and distributed to members of Congress and the newspapers.[22] The title of the publication is *Statistics of the Population: Advance Sheets* (Washington, 1871). The first of these four tables gives the statistics of the American population for the census years, 1790 through 1870, "by States and Territories, in Aggregate, and as White, Colored, Free colored, Slave, Chinese, and Indian." The second gives the population figures for the same period and for each State and Territory, by counties and by the same categories of persons. The third table presents the statistics of "Population, 1870–1850, in each State and Territory, by Civil Divisions less than Counties, as White and Colored, (1870–1850,) and Native and Foreign, (1870)." The fourth gives the statistics for "Nativity, (General,) 1870–1850, and Foreign Parentage, 1870, by States and Territories."

The publication of these tables supplied statistical data for those who had interest and competence in statistical cartography. At any time on and after September 2, 1871, therefore, American statistical cartographers would have been in a position to fuse the new American population data with the new European map technique so as to produce American-made maps in the style of Meitzen. It has been pointed out earlier that several of Meitzen's maps were already on deposit in the Library of

[20] Carroll D. Wright, *The History and Growth of the United States Census*, 57 (Washington, Government Printing Office, 1900).

[21] *Ibid.*, 52–55.

[22] U. S. Census Office, 9th Census, 1870, *The Statistics of the Population of the United States*, 1:vii (Washington, 1872).

Congress. Thus, a model for such work was available; only the impulse was lacking. And now some person supplied the needed impulse. Who this individual was does not appear, but within the walls of the census office, and perhaps as early as the winter months of 1871, work that looked toward the preparation of a series of maps in the style of Meitzen was undertaken.

This progressive but entirely unauthorized administrative cartographic activity came to public notice on January 30, 1872, when Daniel Coit Gilman delivered an address on "Geographical Work in the United States during 1871" before the American Geographical Society in New York City.[23] In the course of his remarks Gilman touched on many topics. His observations on what the census office was then attempting in the way of cartographic work are brief but of great interest. They well serve to indicate the enthusiasm and appreciation with which Gilman welcomed such innovating trials. Praise from this scholar, the professor of physical geography in Yale College's Sheffield Scientific School, and a friend of the geographer, Karl Ritter, was indeed praise from a man of discernment and authority.

Gilman spoke of the Washington enterprise with official encouragement. To illustrate his remarks he used seven manuscript maps, sent from Washington for the occasion by Superintendent Walker. Some of Gilman's comments follow:

> The maps which I now hold before you were prepared under Gen. Walker's direction in the census office, as examples of the mode by which the results of the census may be exhibited on maps. These very maps are soon to be presented to the appropriate committee in Congress, in the hope that their publication will be commended, and that other kindred maps will be prepared and given to the public under the supervision of the Census Bureau.

As Gilman turned to the maps on the wall and made extempore comments on them, it was not always easy for the reporter to catch his enthusiastic remarks. Concerning the first map he observed:

> I hold up first a map of Alabama, which shows at a glance in what part of that State the Africans preponderate, a series of tints being employed, as you observe, which are darker in proportion as the number of Africans increases. Now, it would take a long time to discover from a column of figures the fact which you here see at a glance; that through the middle of the State, from East to West, there is a black belt where the colored people are most numerous. No alphabetic list of counties would suggest that fact, or enable us to surmise the reason. It would perhaps have been better if the structure of the country had been more fully delineated, for here we have only the water-courses. An exhibition of the altitudes of the State would have been a desirable feature.

Two maps showing the distribution of Negroes throughout the entire Southern seaboard in 1860 and in 1870, if compared, revealed, according to Gilman, "the effect of emancipation upon residence." A fourth map indicated the distribution of foreigners in the South. "On it we see that the foreign born population is thickest, where the Africans are not, and *vice versa*." Another map showed the proportion of foreign to total population. "You observe how the line of emigration has been through the North; and it is very curious that of people coming in from Europe, the densest population is found farthest from the sea-coast. They are pressing into Minnesota, the State which has the largest proportion of foreign born people." In the sixth map was exhibited the proportion of Negroes in the Northern States to their total population. The final map in the group delineated the distribution of Germans in the entire country. "It is intended to show us in what parts of every State the German element is most abundant, and then by making a deduction for this preponderance in certain regions, to show what is the average distribution in the remainder of the state." Gilman pointed to the preponderance of Germans in the Saint Louis region, their comparative scarcity in southwestern Missouri, and their marked ascendancy in Hoboken and Jersey City.

Gilman concluded his remarks on these maps by expressing the hope that the society, as individuals and as a body, would exert what influence it rightly could bring to bear upon Congress for securing the publication of some such "diagrams" as those which had been exhibited at the meeting. He also called attention to "a beautiful series of printed maps" which the Prussian government had recently printed and added: "I refer to the atlas . . . [of A. Meitzen] —a work in which, with great clearness, accuracy, and beauty, the territorial divisions, the geographical and geological structure of the country, the density of the population, the wealth, taxation, distribution of industries, etc., etc., are carto-

[23] American Geographical Society, *Journal*, 4:139–143 (New York, 1874).

graphically presented." After his lecture, Gilman lost no time in writing to Walker that the maps had pleased the members of the society.

There is reason to believe that even earlier, in the same month of January 1872, some colleagues of Gilman at the Sheffield Scientific School had joined with him in preparing a memorial, addressed to Walker, "recommending the graphic illustration of the census volumes."[24] To this communication Walker replied on February 5:

> I am much gratified to learn that the maps met the approval of the Geographical Society. We have already learned to improve upon them, and I could send you (but that I now want them for use before Congl. committees) two charts that are much nearer my *idea*, though I still see the opportunities for bettering them. All these experiments with hand work will be found useful should Congress authorize a publication according to this form.[25]

What were the characteristics of these maps which Gilman exhibited? There is not much that can be affirmed of them. The few facts told by Gilman permit a few inferences. Of leading importance is this: The maps exhibited before the society showed the distribution of special classes of the population for particular areas in terms of the percentage that the special class bore to the general population as a whole. It will not do to be dogmatic on this point; nevertheless, it does seem just to say, taking into account the elliptical character of Gilman's remarks as reported, that *this group of maps did not display population densities in terms of densities per square mile.* In this early set of maps the simpler method of indicating preponderance of a given populational element by showing percentages either by a series of color gradations or by a simple majority in relation to the aggregate seems to have been used. In what ways Walker saw how to better the maps he had lent Gilman one cannot say with certainty.

The memorial of the Sheffield professors was forwarded by Superintendent Walker to his administrative superior, the Secretary of the Interior, whose approval was gained.[26] That official, on June 5, 1872, wrote to the Speaker of the House of Representatives, called attention to the importance of illustrating the volumes of the forthcoming census, and submitted an estimate of $25,000 as the amount of money sufficient to cover the cost of preparing and printing a set of twenty statistical maps. The proper congressional committee at preliminary meetings had already learned of the project. A bill for the purpose was introduced into the House, and it speedily became law. The act of June 10, 1872 authorized the exact sum requested by the Secretary for the maps, thus assuring their publication.[27]

The census office staff engaged in preparing the maps for the engravers must have worked hard during the summer months of 1872. The engravers pressed on with their part of the production program, and the project steadily advanced toward completion. Something new, for the United States, was rapidly being accomplished. Walker anticipated the publication of the statistical maps with pleasurable thoughts. In his annual report to the Secretary of the Interior, dated November 1, 1872, the Superintendent referred to the grant of $25,000 for illustrating the census reports and ventured the observation that the money had been spent "with results which it is believed will meet the hearty approval of Congress and the country."[28] After referring to the subjects treated by the maps, Walker continued with this statement:

> The possibilities of this style of illustration are practically without limit. The present, as the first attempt of the kind in the United States, may be found to contain faults of treatment in some particulars; but it is not doubted that this will hereafter be an essential part of the census report. A thousand persons will thus obtain, without effort, just and vivid impressions in respect to the most important features of their country, physically, socially, and industrially, where one will, by long and painful study of the tables of the census, create such a series of pictures in his own mind.

This comment was written almost on the eve of publication. On November 30, 1872, the Government Printing Office made available to the public two census publications, the first, an octavo volume, *A Compendium of the Ninth Census*, which consists solely of tables; and the second, a quarto volume, *The Statistics of the Population of the United States*,

[24] *Statistical Atlas of the United States*, 1 (n.p., 1874).

[25] James Phinney Munroe, *A Life of Francis Amasa Walker*, 122–123 (New York, 1923).

[26] This document has not been found in the National Archives. P. M. Hamer to the writer, Sept. 22, 1943.

[27] 42 Congress, 3 Session, *House Executive Document 9* (Washington, 1872, serial 1563); *U. S. Statutes at Large*, 17:368 (Boston, 1873).

[28] U. S. Census Office, 9th Census, 1870, *A Compendium of the Ninth Census* 2–3 (Washington, 1872).

Embracing the Tables of Race, Nationality, Sex, Selected Ages, and Occupations. The latter volume contains 32 principal statistical tables in more than 800 pages, together with 12 maps. It is volume 1 of the quarto series of the census of 1870. An edition of 25,000 copies of this volume was printed, thus assuring a wide distribution. The second volume of this census, on vital statistics, was published on March 1, 1873; the third, on industry and wealth, on May 9, 1873.

Of the 12 maps in volume 1 the most general shows the "Area: Acquisition and Transfer of Territory, 1780 to 1870" of the United States. It measures 26 by 42 centimeters. In various shades of one color, the area of the Thirteen Original States, and the successive territorial additions thereto, are shown. The map makes a clear bold display.

Two maps in convenient juxtaposition illustrate the data on illiteracy and wealth. South of the Ohio River the percentage of illiteracy rises; north of that river lies the predominant wealth of the country. One map employs six gradations and the other five. A comparative study of these maps yields much instruction.

The maps depicting the distribution and density of the main immigrant groups precisely illustrate the concentrations of these several populational elements. Three maps measuring 20 by 12.5 centimeters show the English and Welsh, the Swedish and Norwegian, and the British American elements in five degrees of density per square mile. The distribution of the Chinese in California, Nevada, and Utah is indicated with six gradations. The two maps exhibiting the distribution and density of the German and the Irish elements measure 20.5 by 24.5 centimeters. This pair of maps, conveniently placed in juxtaposition, permit fascinating comparisons. The densities are figured on a scale of five degrees. These racial elements are shown to have settled by preference north of the Ohio and Missouri rivers. The German concentrations are more dense west of the Appalachians and the Irish to the east of them.

The distribution and density of the country's total foreign-born population is shown on a map measuring 39 by 41.5 centimeters. A map of identical size illustrates the data pertaining to the colored population. Dense areas of Negro population are found in the Blue Grass region of Kentucky, the Nashville Basin, the rich bottom lands along the lower Mississippi River, the Black Belt of Alabama, and the upland cotton-growing zone of the Atlantic South. The foreign-born, by contrast, tended to remain north of the Ohio River. They hold together in one thick belt that extends from Chester County, Pennsylvania, through the intervening States to Essex County, Massachusetts. Another such belt runs from Toledo, Ohio, eastward along the shore line of the lakes to the neighborhood of Watertown, New York. Central Michigan is beloved by the foreign-born, and they thickly congregate in Wisconsin. Numerous other areas could be cited. The foreign-born population of California is shown in a small inset. These two maps, both scaled in five degrees of density, are complex in their representation of facts and supply much food for reflection.

There remains to be discussed the map depicting the distribution and density of the general population of the United States as it was in 1870. The legend on this map, which measures 41 by 45.5 centimeters, reads "Density of Population. Compiled from 9th Census." The scale is in six degrees of density. Areas with a population under 5 persons per square mile have been left blank. A population of 5 to 15 per square mile is shown by a light shade of blue and a population of 15 to 40 by a slightly darker shade of the same color. The fourth gradation ranges from 40 to 75 persons per square mile; the fifth, from 75 to 125; and the sixth, over 125.

This general population map, which ought to have been the crowning achievement of the series, in actuality falls short, for it gives quite a misleading impression. The census report provides population data for the continental United States and Alaska, but the map used for the depiction is limited to the area east of the 99th meridian. Actually, therefore, the map shows only the distribution and density of the population from the Atlantic seacoast through the first tier of States beyond the Mississippi River and the eastern portions of Texas, Kansas, and Nebraska. California appears only as an insert, and the remainder of the Pacific coast, the Rocky Mountain region, and the High Plains are not shown at all. This map is, therefore, an incomplete presentation. It favors the "East" at the expense of the "West." Furthermore, the scale used favors the districts of higher density—the urban and long-settled areas—and slights the areas of recent settlement and low density.

The case of Dakota may be cited. According to the census of 1870, this Territory had a population of 14,181 persons, inhabiting 150,932 square miles,

with a consequent density per square mile of 0.09. Yet, because of the particular scale used, Dakota is represented on this map as bare of any population. A map maker may adopt one of at least two attitudes toward a population total of such small size as Dakota's. He may dismiss it as being too insignificant to trouble about. Or he may contemplate the data and decide to exhibit it, well understanding that what is of significance here is not the *size* of the population but the *pattern of relationships* displayed between density, distribution, etc., of such a sparse population.

The map makers who worked on the census of 1870, for reasons that seemed good to them, chose to use a scale which brought into clearer relief the distribution and density of the population east of the Mississippi. By this choice they pushed into relative obscurity the same categories of data for the population west of the river. Sectional prejudice was not responsible for the choice of scale. But they must have understood that a coarse scale—because it meant the elimination of numerous sparsely settled areas—would facilitate and simplify their tasks. A fine scale would have meant the inclusion of the troublesome territorial jurisdictions and the necessity of many additional calculations, but, on the other hand, it would have resulted in a *complete* map! It is this failure to produce a *complete* map that leads the reader with demographic interests to rate this specimen at something less than of the highest value.

Nevertheless, this map is not without a feature of surpassing interest. When the scale of six degrees of density was applied by the map makers to the general population data of the census, a curious and unforeseen product was derived. The makers themselves left on record no comments, glosses, or interpretations of the map, and we are free, therefore, to study it without having to take account of their opinions. A provocative feature of this map is the relationship between its white areas (under 5 persons to the square mile) and the palest blue areas (from 5 to 15 to the square mile). Where the white areas impinge upon such blue areas, or where such blue areas impinge upon the white, in theory a set of points ends and vacancy beings, or vacancy ends and a set of points begins. As we of today focus our attention upon such portions of the map, we *seem* to see lines. But the lines are not on the map; they are in our minds. We see some things in this map which its makers did not see in it because our minds have been charged with facts and doctrines which were fashioned after they made this representation.

If we look at the map for examples of such impingements as those just noted, we shall find many such "lines." There are some in Florida, Alabama, Mississippi, Texas, Missouri, West Virginia, and Maine. These "lines," it will be recalled, frequently mark the impingement of areas of a population of less than 5 to the square mile upon areas with a population of from 5 to 15 to the square mile. Now to the readers of today, these "lines," subjected to a process of definition, are transformed suddenly into familiar entities. Thus, when, wise after the event, we define areas that are under 5 persons to the square mile as "frontier areas," we then recognize that the "lines" which bound "frontier areas" become "frontier lines."

This transforming operation having been accomplished, we again study the map. We now see such "frontier lines" in Maine, New York, West Virginia, Georgia, Florida, Alabama, Mississippi, Louisiana, Texas, California, Missouri, Kansas, Nebraska, Iowa, Minnesota, Wisconsin, and Michigan.

Such "lines" may be classified into two main groups. Those in the first group may be thought of as circles or particular distortions of circles. The lines in this group extend from their points of origin and return upon themselves to the points of origin. Those in the second group may be thought of as theoretically straight lines or as particular distortions of straight lines. The lines in this latter group do not return upon themselves; they have, instead, points of origin as well as points of termination, and these starting and ending points are not identical. The lines in the second group are of differing lengths. We find among them a single example of a frontier line that is both relatively and absolutely long, and many examples of others that are shorter or short, relatively or absolutely.

Directing our attention now to that particular line which possesses maximum extension, we may describe its path. This "frontier line" has its point of origin—or termination—on the coast of Texas. Enclosing much of the eastern portion of this State, it strikes north along the western border of Arkansas, then swings west and with numerous sinuosities hems in eastern Kansas, eastern Nebraska, about three-quarters of Iowa, as well as respectable areas of Minnesota and Wisconsin. The "frontier line" that we are tracing has its point of termination—or origin—on the Wisconsin shore of Lake Michigan. This line of maximum extension

is generally referred to as "the frontier line," though to speak strictly, it is but one of several such to be found for the census year 1870. And had the map makers located all of the territorial populations upon the map, it may safely be premised that they would have delineated still other "frontier lines."

Now, it is psychologically both possible and necessary *for us* to see these "frontier lines" upon this map because *we* are familiar with the definitions of frontier areas and frontier lines. Frederick Jackson Turner did not live in vain. But the makers of this map saw no such lines, because the statistical definitions of frontier areas and frontier lines had not yet been framed. The framing of the statistical concept was a work reserved for the future; indeed, for the very near future. But the frontier areas, statistically defined, did not yet exist for those who made this map. They do exist for us when we look at it, though only because we read them into it. This, then, is that feature of surpassing interest which this map possesses: It displays the first representations of frontier lines to be shown on any United States census map. And not one frontier line but a plurality of frontier lines is there displayed.

The frontier lines for the year 1870, as given on this map, differ in location, etc., from the frontier lines for 1870 as given, for example, on the corresponding map in the census reports of 1880. The reason for the discrepancies is that the earlier map for 1870 is constructed according to one scale of density, but the later map for the same year is based on another. Other maps would be possible; as many scales, so many maps. One can conceive of a scale, for instance, that runs under 3 to the square mile, 3 to 17, 17 to 50, 50 to 100, etc. The frontier lines on such a map would differ from any now known. Change the convention, and you change all. In 1870 the convention employed a coarse scale; in 1880 it used a refined scale. But the best scale for the purpose is that which gives the most adequate rendering of the underlying realities of population.

The volume of the census of 1870 on the vital statistics of the country contains four maps and three charts. The charts are devoted to the elevations, the temperature, and the rainfall of the United States, and the maps show the geographical distribution and the degree of prevalence of certain diseases. "Deaths from Consumption," "Deaths from Malarial Diseases," "Deaths from Enteric, Cerebrospinal and Typhus Fevers," and "Deaths from Intestinal Diseases" are the titles of the four maps in this series. The delineations were made by A. de Witzleben, and the lithographic work was done by two Philadelphia firms. Each map measures 40 by 41.75 centimeters. The basis of each presentation is an outline map which shows the boundaries of the States and the chief rivers and lakes. The maps cover the area from the Atlantic coast to the lands beyond the big bend of the Missouri River; only parts of Nebraska, Kansas, and Texas appear. California is shown as a small inset. The districts in which the incidence of a given disease is highest are shown in the most intense shade of a given color; districts with a lower incidence are shown in less intense shades of the same color. A glance at any one of these maps teaches the observer the relative degree of prevalence of any given form of illness in any particular district. The geography of sickness has thus been made manifest. Tuberculosis, for example, is chiefly a "northern" disease, as malaria is a "southern."

The "Hypsometric Sketch," or chart of elevation, came into existence through the pooled data of several scientists. Arnold Guyot of Princeton College permitted the census office to use the plates of his elaborate physical map of the country, and to this Charles A. Schott of the Coast Survey Office added "by far the most complete and accurate series of elevations yet attained."[29] This and the other two charts in the same series measure 42 by 26 centimeters. They were thus wide enough to exhibit the data for the entire area between the two oceans. They show river systems, mountain ranges, political boundaries, and leading cities. On this foundation the lines of equal elevation are set down by the following scale: Above 8,000 feet; from 4,000 to 8,000 feet; from 2,000 to 4,000 feet; from 800 to 2,000 feet; from 400 to 800 feet; and from 400 feet to sea level. The Far West was just being opened up when this map was published, and knowledge of that region was popular rather than scientific in those days. The map must therefore have been of great value. Walker wrote that it and its fellows were "eloquent with instruction upon the agricultural capabilities of the country and the conditions of human life among us."[30]

The temperature chart was constructed in Octo-

[29] U. S. Census Office, 9th Census, 1870, *The Vital Statistics of the United States*, 2:ii (Washington, 1872).

[30] U. S. Census Office, 9th Census, 1870, *A Compendium of the Ninth Census*, 2.

ber 1872 and displays the isothermal lines of the mean temperature for the year.

The rain chart was constructed in August 1868 and uses this scale: 20 to 32 inches of rain; 32 to 44 inches of rain; 44 to 56 inches of rain; and 56 inches and over. This map makes a particularly attractive appearance. The color used is well chosen, the general effect clear, and the data exhibited are not so numerous as to obscure the basic patterns of rainfall distribution. In 1868 the Far West held many a secret of nature, and the map maker recognized the tentative character of his statements concerning the Rocky Mountain region and other outlying districts when he added: "The precipitation on the mountain ranges west of longitude 104°, though often considerable, is too imperfectly known to be fully delineated."

The material in the third volume of the Ninth Census consists chiefly of statistical tables which are devoted to agriculture, mining, fisheries, wealth, taxation, and the public debt. The text and tables are illustrated by 6 maps. The final illustration, a large geological map of the United States, is contained in a pocket at the end of the volume. It measures 81 by 54 centimeters and uses a scheme of 9 colors to localize the principal geological formations. The data exhibited were derived from C. H. Hitchcock of Dartmouth College and W. P. Blake. These scholars were distinguished students of the earth sciences. Blake had been an explorer of the Far West. Walker's tribute to this Yale man deserves quotation:

> In the work of compilation great assistance has been rendered by Professor William P. Blake, of Connecticut, who is responsible especially for the coloring of the western portion of the maps. Professor Blake's knowledge of the Territories, both on account of personal observations and editorship of the results of other explorers' work in the reports of the Pacific Railroad surveys, enables us to present the best interpretation of the geological structure of the Territories yet offered to the public.[31]

The six maps which illustrate the tables in the third volume are concerned with wheat, corn, cotton, hay, tobacco, and dairy products of the United States.[32] Nothing like this series of crop maps had ever before been seen. The corn map, measuring 19.5 by 22.5 centimeters, is a splendid example of the usefulness of the graphical method. From this map one quickly learns that the upper half of Pennsylvania, all of New England and New York, as well as limited areas in the more elevated districts of Virginia and other southern coastal States lacked importance for the growing of this staple in 1870. Leading areas of production are southwestern Iowa, eastern Kansas, a belt along the Mississippi River immediately south of its junction with the Ohio River, and a broad tract of counties in central Illinois. The four gradations of color convey a precise notion of the distribution of this crop and its relative importance in the economy of each State and region. Corn production, the map shows plainly, was widely distributed.

The cotton map, by contrast, exhibits a crop of sectional importance only. The chief cotton-growing area in 1870 is seen to be a group of counties on both sides of the lower Mississippi River. This tract extends from central Arkansas and northern Mississippi to central Louisiana. Isolated areas of high cotton productivity stand out in northeastern Mississippi, in extreme western Arkansas, and in the Tampa Bay region of Florida. On this map the cotton production of Alabama and Georgia is plainly exhibited. The maps on tobacco, hay, and dairying also delineate the regional distribution and importance of these agricultural products.

Very interesting, too, is the map devoted to wheat.

[31] U. S. Census Office, 9th Census, 1870, *The Statistics of the Wealth and Industry of the United States*, 3:754 (Washington, 1872). On Blake, see *Dictionary of American Biography*, 2:345–346 (New York, 1929); on Hitchcock, see *ibid.*, 9:69–70 (New York, 1932).

[32] The method of constructing this series of maps is explained by the Superintendent of Census in U. S. Census Office, 9th Census, 1870, 3:367 (Washington, 1872). "In constructing the scale adopted for the several crop maps (dairy products excepted) of the present volume, the number of bushels, tons, or pounds (according to the unit of quantity appropriate to the special crop) produced in each county, by turns, was divided, first, by the number of inhabitants, and, second, by the number of acres of improved land in the county; the two quotients thus obtained were multiplied together, and the square root of the product taken as the measure of the productive power, in respect to that crop, of the county. This mode of constructing the scale for the crop maps must be admitted to be somewhat arbitrary. The Superintendent can only say for it that he believes it effects the object in view better than any other, and that he knows of no other scheme for exhibiting these features of production to which more objections do not lie than to the one here adopted." Six subsequent paragraphs develop these ideas in detail.

Its size (40 by 24 centimeters) makes possible a national presentation of the facts. The wheat areas are shown from the Atlantic to the Pacific and can be studied in relation to the drainage basins. The range of cultivation is indicated by a scale of four degrees of intensity. Strikingly evident is a wheat belt, narrow and long, running from southwestern Virginia northeastward into the Susquehanna Valley area. Another area of high yield appears at the confluence of the Missouri and the Mississippi rivers. Of equal importance is the belt stretching across south-central Indiana and southern Ohio. Clearly revealed is the large-scale production of middle Iowa and southern Minnesota and a narrow tongue projecting eastward into Wisconsin. Notable, too, is the maturity of wheat cultivation seen in the Sacramento Valley of California and the commencement of its culture in the Salinas and upper San Joaquin valleys of that State. Secondary centers for the cultivation of this staple are revealed as existing along the upper reaches of the South Platte, in southern Montana, and in the irrigated valleys south of Salt Lake City. This map makes a pleasing appearance and teaches many lessons simply and tellingly. It must have had a high value for reference purposes in the days when such constructions were still novelties.

In the way just narrated, official statistical cartography began in the United States. Its first flowering had shown itself. The hidden roots of the phenomena were buried in European soil, especially in Berlin, where, a few years later, a separate though parallel development took place. Lest entire concentration on the American scene lead to false inferences and a warped understanding of the cartographic phenomenon as a whole, we must glance at this Prussian showing.

The earliest statistical diagrams to appear in a publication of the Prussian statistical bureau are in the *Zeitschrift* for October 1870. A careful search has revealed none earlier. There are 9 in all, some in colors, some in black and white. In the same issue, Engel, the bureau's director, included a contribution, "Die Vertheilung der Bevölkerung des preussischen Staats auf Alters- und Berufsklassen in graphischer Darstellung."[33] These diagrams make an excellent appearance, and all are full-page size. It should be noted that there are no statistical maps in this series. Volume 11 of the same publication has a full-page colored statistical diagram captioned, "Staat und Gesellschaft."[34] In volume 12 an article entitled "Graphische Darstellungen zu dem Aufsatze; Beiträge zur Statistik des Krieges von 1870–71" is illustrated with 7 plates of statistical diagrams. Several of these are in 3 colors; others in 2 colors. Bar diagrams are most often used in this showing.[35] There is one map, but it is not statistical. Examination of another serial of the Prussian statistical bureau, the *Preussische Statistik*, reveals similar examples of the use of graphical methods.[36]

The imperial statistical office of the German Empire began the publication of its *Statistisches Jahrbuch für das Deutsche Reich* in 1880. The volumes in this series are illustrated by statistical maps of extraordinary variety and refinement. Commencing with volume 1, the maps in each are worthy of comparison with those which were appearing in the reports of the United States census of 1880. Each of these German volumes usually has 3 maps. Of more than routine interest are the map at the end of volume 1 (Berlin, 1880) showing the distribution of religious denominations in Germany at the census of December 1871 and the maps at the end of volume 7 (1886) and volume 11 (1890) showing the distribution of the several German political parties.

Enough has been said to indicate that, parallel with the American interest, there also existed and throve first a Prussian and then an imperial German interest in statistical cartography. The publications of the Germans in this field should not be lost sight of by those who are interested in the coeval development of American statistical cartography. The climax of elegance in German statistical cartography was reached in 1905 with the publication of the *Statistischer Atlas für den Preussischen Staat*, issued as the third volume of the *Festschrift* commemorating the hundredth anniversary of the founding of the Prussian statistical bureau.[37] This beautiful and instructive work consists of 116 plates.

[33] Preussisches Statistisches Bureau, *Zeitschrift*, 10:395–398 (Berlin, 1870).

[34] *Ibid.*, 11:210 (1871).

[35] *Ibid.*, 12:310 (1872).

[36] The plates used in the *Zeitschrift* for October 1870 were reproduced in the *Preussische Statistik*, v. 16, pt. 2 (Berlin, 1871). *Ibid.*, 32 (1874), has a bar diagram; 39(2), 1882, 8 statistical charts in color; 66 (1883), 11 colored statistical diagrams and maps on 9 plates; 68 (1883), 2 plates of statistical charts; and 70(1), 1887, a statistical map in color.

[37] Preussisches Statistisches Bureau, *Festschrift des königlich preussischen statistischen Bureaus zur Jahrhundertfeier seines Bestehens, Dritter Teil, Statistischer Atlas für den preussischen Staat* (Berlin, 1905).

Most of the plates, which are in colors, deal with social and economic conditions in Prussia. There are diagrams, etc., as well as statistical maps in this volume. It is in every way worthy of careful inspection by all interested in the cartographic representation of social, economic, and political data. And here the story of the rise of official statistical cartography may fittingly close.

SHINGLE MAKING ON THE LESSER WATERS OF THE BIG CREEK OF THE FRENCH BROAD RIVER

EDMUND CODY BURNETT

Del Rio, Tennessee

It has been said, and with some marks of verity, that, with the first wagon train to a projected settlement on the frontier, went a Baptist preacher. But, when he arrived at his destination, he found a Methodist preacher already on the spot, sitting on his saddlebags, his horse hitched to a tree, waiting for the caravan of settlers. I do not know that the enterprising denizens of Big Creek Valley in Tennessee had bunches of shingles stacked beside the railroad ready to be loaded on the first train out, but they might well have done so. That first train, so it would appear, pulled out from the station then called Big Creek, now known as Del Rio, at 5:30 on the morning of August 11, 1868. For the time being Big Creek was the terminus of the road, but trains had been operated between Morristown and Clifton, the present Newport, since the fifth of the preceding February.[1] Therefore, the aforesaid enterprising denizens had had a full six months' notice of the coming opportunity. Certainly little, if any, time was lost in making full use of it.

Neither is it possible at a distance of eighty years save two to determine when the first sawmill outfit arrived at Big Creek, but it is certain that such an outfit was among the earliest hauls of the Cincinnati, Cumberland Gap, and Charleston Railroad into that valley, whose people were eager to be up and doing—doing something besides clawing a scant living, mainly in the form of corn, from meager coves and steep hillsides. At all events the railroad began almost immediately to gather from the rich forests of that small valley of the Appalachians a goodly harvest.

The lumbering business in general has flourished in the valley and the region roundabout from the summer of 1868 to the present day, but the story here told is limited to that of one tree and one of its products during a period of a little over a decade. The tree is the white pine, the product shaved shingles, and the period 1868–1880.

Besides the white pine, five other trees have played stellar parts in the economic history of the valley. These are the walnut, the poplar, the oak, the hemlock (alias spruce, or spruce pine), and the chestnut, with a little maple thrown in for good measure. Latterly another tree has pushed its way to the front, not so much from obscurity as from disrepute and scorn. This is the pine known over the country as black pine, jack pine, old field pine, scrub pine, and bastard pine. It was not even esteemed for firewood, if anything else was available. In recent years, however, this renegade among the pines has attained a place in the economic world as pulpwood. Even in our small segment of the mountains it brought in a good many thousands of dollars during World War II.[2]

[1] For a summary of the evidence see this writer's article, "The Railroad Comes to Big Creek," Railway and Locomotive Historical Society, *Bulletin*, October 1946, which also provides a sort of crow's-eye view of the valley of Big Creek on the French Broad River.

[2] The article cited in note 1 includes (note 7) some figures on outgoing shipments and railroad freight earnings at Del Rio in a recent period. During the recent war some $65,000 in war bonds were purchased by the patrons of the Del Rio post office, while an amount, probably in excess of that figure, was withheld from salaries of local citizens. A man who hauls acid wood out of the mountains purchased $8,000 worth. The post office of Del Rio is the only one in Cocke County that received the following citation: "For Patriotic Cooperation Rendered in Behalf of the War Finance Program This Citation Is Awarded the Patrons of Del Rio, Tenn., Post Office. Given under My Hand and Seal the 22 Day of Jan. 1945. Henry Morgenthau, Jr." The first plaque to be placed on a piece of war material (a quarter-ton truck) in the State of Tennessee was from Del Rio. It bears the inscription: "Presented to the U. S. Army by the Citizens of Del Rio." These facts were furnished by Miss Nannie F. Jones, postmaster of Del Rio.

It was the walnut tree that for several generations supplied the wood for most of the furniture, fashioned by the community's own cabinet workmen. To sleep in a bed made of anything but walnut was to lower self-respect. Not until walnut became scarce and the railroad brought factory-made furniture of oak and other woods, at the same time extinguishing the craftsmanship of the woodworker, could a housewife with any measure of pride resign herself to the inevitable decay of the times. In my youth there were still a good many noble walnut trees to be seen. In our schoolyard, which was also our churchyard, stood as fine a group of walnut trees as the eye has ever beheld. I sometimes persuade myself that both religion and education have sadly declined since they were cut down.

Oaks of several varieties, especially the white oak (*Quercus alba*) and the red oak (*Quercus rubra*), were abundant in our forests. The red oaks were particularly prized as rail timber, and it required many trees to supply the miles of rail fences that were necessary on every farm of considerable size. The oaks that I have myself seen made into rails on our farm, if they were still standing, would fetch far more than the entire farm without them. White oak, a tougher wood and less easily split, was occasionally made into rails, but it was especially valued as wagon timber, although there was no substitute for tough hickory for axles. In my youth very little oak in our community was converted into lumber.

In those early days the timber made into lumber was chiefly poplar, for magnificent poplars grew in every cove and hollow, and poplar lumber was in great demand. It was soft and smooth and could be had in almost any desired length and width clear of knots. The largest of these poplars within easy reach of the river were particularly sought after to be made into canoes or dugouts. There was always need of one or more canoes wherever a ferry was maintained; besides, every family along the river must have a canoe for its own use. Trees as much as 4 feet in diameter at the stump abounded, and trees 5 or 6 feet in diameter, though not common when I can first remember, were still to be found here and there. I well remember one canoe that must have been made from a tree close to 6 feet in diameter, for its hold was something like 5 feet wide. It had been skilfully and beautifully carved, with an ornamental prow and stern, suggestive of the viking ships, pictures of which I had seen. Time came when, for the ferry at Big Creek, search had to be made far and wide for a poplar big enough to make even a passable canoe. A few years more and resort was of necessity to a canoe made of plank. Dugouts became only a memory.

What was almost universally called spruce, sometimes spruce pine, in our mountains, until the lumberman from up north came along and called it hemlock, is actually assigned by the botanists to the hemlock family, and the particular variety in our forests is termed by them *Tsuga canadensis*.[3] Submissively we yielded to the name hemlock for the lumber, but that same tree, old or young, when it adorns the grounds of our dwelling places, we will call spruce until it shall be gnawed down by the tooth of time. It was a late comer in the lumber business, for the grain is seldom straight, and the wood is coarse and brittle, qualities that limit its serviceability even for rough framing. In our locality its history is chiefly limited to its use for tanbark and pulpwood. When a tannery was established in our county, hemlock trees by the thousands were felled for their bark alone, and the trunks were left lying in the woods to rot. The demand for the wood in the pulp business did not come until the supply of trees in our valley had almost entirely disappeared. Deep in the mountains, however, there were, and still are, immense growths. At the present time many carloads of huge logs, mostly wind-shaken, are being shipped from Del Rio.

As an ornamental tree our Appalachian spruce (hemlock to you) plays an important role, although chiefly in its youth. Grown in the open its cone-like symmetry and beauty are surpassed by few if any of the genuine spruces. Properly trimmed it has its place among the ornamental shrubs and makes a beautiful evergreen hedge.[4] In our

[3] See Charles Sprague Sargent, *The Silva of North America*, 12:63–68 (Boston and New York, 1898), and *Manual of the Trees of North America*, 43–44 (Boston and New York, 1933).

[4] According to *ibid.*, 65, *Tsuga canadensis* has been a favorite ornament in the parks and gardens of the United States and Europe for a century and a half. As early as 1691, one of the trees, the gift of John Banister of Virginia, was growing in the London gardens of Bishop Compton. In beauty and stately grace, remarked Sargent, *Tsuga canadensis* "has no rival among the inhabitants of the gardens of the northern United States, when, with its long lower branches sweeping the lawn, it rises into a great pyramid dark and sombre in

region it is the favorite Christmas tree. Not far outside our valley, close by the eastern end of the Great Smoky Mountains National Park, is an extensive nursery devoted chiefly to the growth of spruce from seedlings gathered by the thousands from the nearby forest.

The wood of the chestnut was not esteemed for any purpose except fence rails, and for that purpose only comparatively young trees were serviceable. In the localities where chestnut trees abounded, it was a common sight to see acres of them deadened preliminary to clearing the land, and many crops might be raised before all the dead trees were removed. Only after thousands upon thousands of these trees had been piled and burned or had rotted into the soil, did the call come for chestnut wood for its valuable acid. Chestnut acid wood has, nevertheless, for a good many years been the source of many a living in our mountains.

About 4 miles from the railroad, numerous long hollows converge and their several streams unite to make the one called Big Creek. Geographically speaking, the place is a miniature Pittsburgh. It required no superlative genius to fix upon this spot as a suitable location for a sawmill, and a sawmill outfit, including a newfangled circular saw, was among the earliest deliveries of the railroad. It was characteristic of East Tennesseans that the place should be immediately dubbed Slabtown.[5]

This sawmill was not the first in the valley, although it was, I believe, the first to use a circular saw. This type of saw was a comparatively new device, having come into use only about the middle of the nineteenth century. The earlier sawmills had been the gate or sash type, that is, a straight saw, somewhat like a hand saw, though power driven. The stark old skeleton of such a mill, roofless and with the straight-up-and-down saw in place, rusting away, was a familiar sight to me in my early boyhood. Its site, just below a natural waterfall, was only about a mile and a half from my home, on land once owned by my grandfather and now in my own possession. Every vestige of the old mill, except a rock wall, has disappeared, but a nearby barn has planks still bearing the marks of that old saw.

Naturally, with water power available almost anywhere along any of the creeks, Slabtown did not retain its monopoly of the sawing business. Before many years had passed another mill was erected in the upper reaches of one of the long gorges, and because of the outfit's prevailing color the place was called Blue Mill. And it is called that to this day, although the mill has long since gone, and only the sky above is blue.

Even with two mills busy, however, lumber making was bound to have been on a comparatively small scale. It was only when portable steam-driven mills came into use, as they did a few years later, that lumbering in our mountains attained really large proportions. It was almost at the same time that the shingle mill, a mill for sawing shingles, was introduced, bringing to a close the era of the shaved shingle. By that time, moreover, the growth of virgin white pine, which had been the basis of the shaved-shingle business, had been pretty well exhausted.

It was, in fact, the magnificent white pines that supplied the first impulse to the development of the business in shaved shingles in the region the moment the railroad gave access to a market for the product. Like the hemlock, or spruce, essentially a tree of northern latitudes, the white pine ranges from Newfoundland to Manitoba, southward to Illinois, and follows the Appalachians throughout their extent. At the time of which I speak, the hills and mountains through which flow the multitudinous streams that race and ripple to their confluence in one or the other of the two Big Creeks for their ultimate deliverance to the French Broad River had a growth of white pine said to have been unsurpassed in all the southern Appalachians. Indeed, the white pine, although not without its preferences of soil and environment,

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winter and light in early summer, with the tender yellow tones of its drooping branchlets and vernal foliage." *Ibid.*, 66.

[5] It was also characteristic of the folks roundabout that, when, in the course of years, Slabtown was by way of becoming a metropolis and took steps to have itself constituted a post office in its own right, the residents of the vicinage cast about for a name more refined than Slabtown, a name less indicative of the rough and raw. What more appropriate than to honor the pioneer, and still dominating, family of Goodnough? The head of that family was, however, a modest man and a man of commendable pride. To call it Goodnough was to tax everybody's credulity, including his own. "Just call it Nough," said he. And Nough it became, and Nough it remained, until rural free delivery wiped it off the postal map. In the years that have followed old Slabtown has shouldered its way back to the front and horned Nough into the ditch, from which it will probably never be able to scramble.

was, and still is, one of the most characteristic trees indigenous to the region.

The white pine under favorable conditions grows to a height of 100 or 120 feet, with a diameter of 3 to 4 feet, or exceptionally to a height of 250 feet, with a diameter of 6 feet.[6] Whether our early shingle makers found trees of that exceptional size I do not know, but trees 150 feet high and 4 feet or more in diameter were not, I think, exceptional among the virgin stands, although it is doubtful whether trees of that size are now to be found anywhere in our valley.[7]

Scarcely any one, it seems, can write about the white pine without heaping the measure of enthusiasm to the brim. The great authority, Charles Sprague Sargent, asserted that the white pine is "the most valuable timber-tree of north-eastern America." Then, being historically minded, he added: "*Pinus Strobus* has played a conspicuous part in the material development of the United States and Canada. Great fleets of vessels and long railroads have been built to transport the lumber sawed from its mighty trunks; and men have grown rich by destroying it, building cities to supply the needs of their traffic, and seeing them languish as the forests disappear."[8]

Turning from such a scene of desolation to a forest still unslaughtered, Sargent exclaimed: "The most beautiful Pine-tree of eastern America, our sylvan scenery owes the peculiar charm which distinguishes it from that of all other parts of the world to the wide-spreading dark green crowns of the White Pine, raised on stately shafts high above the level of the forest roof and breaking the monotony of its sky-line." Another writer has even offered the white pine a queenly crown: "Tall, stately, with massed, lacy-looking foliage of slender, blue-green needles in graceful, airy tassels, the white pine is a very regal Queen of the Forest."[9]

To the mind of another enthusiast, one whose eyes have caught not only the grace and beauty of the individual tree but whose soul is attuned to the orchestral symphony that comes from a grove of white pines when the breezes are astir, the white pine is "the graceful goddess of the tree family." Sorrowfully he calls to mind that our pioneer ancestors, even as they strove to build a nation, "sacrificed" many of these noble trees for log cabins, barns, mills, stores, and other utilitarian purposes, taking comfort the while that "the queens among them were marked for the masts of great sailing ships."

It is, of course, the glory of the undesecrated, the unspoiled forest that inspires this same writer's song of praise:

> The white pines wear a beautiful dress of delicate needles arranged in groups of five. Their slender branches sweep out horizontally, with tips that often curve upward. The needles have small but distinct whitish lines on the lower surfaces. The imbricated, brownish cones are things of beauty from time of formation until the scales obey Nature's law and open their hearts, that the winged seeds may sail away on currents of air.
>
> The goddess of the trees sings a constant song among her branches. When the breezes are strong, her soft aria is rich and full. There are those who think the pine is plaintive and melancholy; perhaps that is because she prefers gentleness and quietness in a world that's noisy and blatant. As the green-clothed branches sway and move, they seem to be talking among themselves; sometimes almost whispering; again, their conversation is animated and cheerful. The tall pines know the cycle of earth's seasons. Through winter blizzards, spring rains, summer heat and the frosty starlight of autumn they live in poise and graciousness. The pines stand calmly and speak gently in a world where men make cacophony and confusion.[10]

Apart from the crowded forest, the white pine, like the Appalachian hemlock, has long played an important part in ornamental landscaping, although it can scarcely rival the youthful spruce for beauty and symmetry. The denizens of our

[6] Sargent, *The Silva of North America*, 11:17, and *Manual of the Trees of North America*, 3–4.

[7] The white pine grows taller in the forest than it does in the open. Most of the exceptionally tall white pines in our woods have drawn the lightning and so have perished. A fair example of what a white pine will do within a lifetime such as my own is one that was planted in our front yard in 1875 and died in 1943. As nearly as can now be determined, its height was about 110 feet and the diameter of the stump 3 feet, 4½ inches. A companion tree of approximately the same size continues to flourish 30 feet away.

[8] *The Silva of North America*, 11:21.

[9] Charlotte Hilton Green, *The Trees of the South*, 469 (Chapel Hill, 1939).

[10] Quoted from an editorial in the *New York Times*, Jan. 29, 1945, with the gracious permission of Charles Merz. See also the editorial, "Green Ladies," in Washington, D.C., *Sunday Star*, Apr. 14, 1946.

hills were, however, little concerned with the beauty of the white pine, whether in the deep forest or in the front yard, and probably not at all with the music of her wind-swept branches. Some of them had, no doubt, heard of the use of the tall trees for masts, but probably not one of them had ever looked upon the sea or beheld a ship at sail.[11] To them the big tree meant so many feet of lumber or so many shingles, in exchange for which they might obtain the necessities and comforts of life.

For the people of our valley, the years following the Civil War were very hard. For most of them the necessities were scant and comforts were scantier. The majority of them were barely able to produce on their small farms of coves and hillsides sufficient corn for their bread and possibly for fattening a hog or two, although for the latter purpose the mast of the woods furnished a very important part. Corn bread and bacon, particularly in winter, constituted their principal diet. Wheat bread was everywhere a luxury; for one thing, because they could not grow sufficient wheat for their support, and, for another, because, if their supply of bread ran short, one day's work in the valley would earn them a bushel of corn, whereas it required two to earn a bushel of wheat.

These, then, were the fundamentals of the shaved-shingle business: the abundant trees, the universal needs, and the sudden opening of a market. But there was another potent factor in spurring shingle making into immediate and almost universal activity. The business called for little capital. The necessary tools were the ax, the saw, the frow, the mallet, the drawing knife, and auger. Almost anybody could acquire these. Two essentials, not difficult to make, completed the equipment: a shaving horse and a press.

The shaving horse was a slab of timber, usually hewn out, about 8 feet long, 8 inches wide, and 4 inches thick, with 2 short legs at one end and 2 longer ones at the other, giving the horse, or bench, a slope that greatly facilitated the use of the drawing knife. Through a mortise near the higher end of the bench ran a lever, hinged on a wooden pin and having at the upper end a square-chinned knob for gripping the board, while attached to the lower was a pedal by means of which the workman's foot applied the necessary power for holding the board in place. The workman sat astride the shaving horse and, for his own comfort and for the protection of his trousers, he made himself a sort of saddle, or padded seat, like as not a piece of old quilt, topped with a sheepskin.

The press for bunching the shingles consisted of a frame, essentially a box with one end open, in which the shingles were laid, thin ends overlapping, until the required number of layers for a bunch had been laid. By means of a hand lever the bunch was compressed until it could be securely clamped. The clamp consisted of two small sticks of timber, 2 or 3 inches in diameter, one at the bottom, the other at the top of the bunch, the two being held together by smaller sticks, like the rungs of a chair. With the invasion of the shingle mill a different type of compress was introduced, one that made bunching a much easier process. The compression was by means of a wheel and screw.

Two standard widths of sawed shingles, the only type of wooden shingle known to many people of this generation, have prevailed in different localities, the 4-inch and the 5-inch. In our locality, so far as I recall, only the 4-inch sawed shingle was ever made. The shaved shingle, on the other hand, though it was counted by inches, might be of any width from 2 to 12 inches. Indeed many a shingle maker seemed to take pride in making his shingles as wide as practicable, and all of them liked to have exceptionally wide shingles with which to dress the outside of their bunches—much as the apple packer selects his finest apples for the top layer of his barrel or basket. In short, the shingle maker and his drawing knife were the veritable arbiters of the shingle's format; accordingly, as in every handicraft, the product bore the impress of the artisan's individuality.

In the matter of length there could not of course be the same freedom of choice. A roof made of shingles of irregular width might, according to some tastes, be lacking in harmony, but, if the shingles were properly made and well laid, only a straight-laced mind and a sour soul could find fault with it. Lengths, however, must be uniform. Three standard lengths have prevailed, 16, 18, and 20 inches. Our shingles, both shaved and sawed, were uniformly 18 inches long.

[11] George William Huntley, Jr., *A Story of the Sinnamahone* (Williamsport, Pa., Williamsport Printing and Binding Co., 1936) is characterized in its preface as "Unwritten history of the old white pine days on the Sinnamahoning from 1865 to 1885."

Sawed shingles were usually put up in bunches of 250; which is to say, 25 courses, each course being 10 shingles with overlapping ends. Latterly they have been marketed to some extent in smaller bundles. Shaved shingles, on the other hand, were almost invariably put up in bunches of 500, the count, as I have indicated, being by inches and not by individual shingles. Only rarely were they to be seen in so-called quarter bunches. Just why our shingle makers should have made their bunches so large is a question I am unable to answer. They were so heavy that two men were required to lift them on and off the wagons and to load them into railroad cars.

Just who, if any one in particular, is to be credited with having initiated the shingle business on so extensive a scale, is another thing that history will probably never tell us.[12] Very likely it was the storekeepers, my father, for one, who found the market. What we do know is that shingle making is a very old handicraft, maybe antedating Noah's ark, and that shaved shingles on a small scale for local use had been made in our settlement since the early days. We also know that, in that unspoiled era, our woods were fairly asquirm with handicraftsmen of many kinds.

The first stage of shingle making is, of course, felling the tree, which in those days was normally done with the ax alone. The white pine, as it grows in the forest, tends to drop its lower limbs, with the result that, when the bark of the tree is removed, belts of knots, often very small, are revealed all along the trunk of the tree. These belts of knots must be sawed out as it is only between them that a clear shingle may be obtained. To the modern lumberman this is a great waste of timber, and even the maker of sawed shingles paid little regard to the knots.

It was only in sawing the tree into blocks that the shingle maker needed assistance, that is, some one to pull the other end of the crosscut saw. Even that was not absolutely necessary, for a man could hang his hat on the other end of the saw to balance it and still do a pretty good job of sawing.

Next, with frow and mallet, the blocks were rived into boards of a thickness to make a shingle a good half inch at the butt.[13] Shingles of less thickness were sometimes made, but they were not in good repute. With a pile of boards beside him, the shingle maker seized his drawing knife, bestrode his wooden steed, and went proudly and joyfully to work.

[12] I have an impelling desire to preserve here for posterity—even though posterity may not care a knotty sawed shingle for the gift—the names of some of the principal makers of shaved shingles which have been supplied by my fellow pilgrim, J. W. D. Stokely. He knew personally most, if not all, of the men here named, and I knew several of them. To give the list an alphabetical order, there was the Arrowood family, James and his three sons, W. M., John, and Henry; Ben, Ira, and Nige Ball; Mordecai Bible; Adam, Royal, Matthew, John, and Solomon Black; Hugh Clark; William, Robert, and Nathan Davis; Benjamin, James, John, Burt, and Isaac Ford; Isaac, Dennis, and William Green, with Isaac's five sons, James, W. M., Reuben, Milburn, and John; Andrew and Calvin Holt; Wyatt, John, Wiley, and William Jones; David and Lee Knight; John, James, Gooler, William, and Green Rose; Abijah and Thomas Simmons; William, Cobb, Joel, Louis, and Lawson Smith; George Sparks; Edward and Reuben Teague. Most of these men resided in what is known as the Grassy Fork settlement.

Concerning these men Stokely further remarks that most of them had a useful trade. The Smiths, for instance, were blacksmiths and also gunsmiths. The Simmonses were coopers and made such things as water kegs, washtubs, kraut stands, and barrels. The Fords manufactured looms, spinning wheels, and corded bedsteads, a type of bedstead that has gone almost entirely out of use. The Teagues were also skilled woodworkers, their products including such things as bread trays, butter bowls, and measures of various sizes. In short, it was a community of skilled artisans.

W. V. Jones, lord of many acres at the head of the valley, believes that the Goodnough brothers, Charles S. and L. D., who came from the white-pine region of Pennsylvania about 1868, started the shaved-shingle business in our valley.

[13] In short, all the shingle maker has thus far done is to make boards, essentially as would be done if they were intended to go directly on a roof without benefit of drawing knife. Boards (or "shakes" as they are called in some localities), usually made of oak, were still much used in our country, even in the era of the shaved shingle. But our folks would have been ashamed to call a board a shingle, as some people elsewhere seem to do. Says Stanley F. Horn, in *This Fascinating Lumber Business*, 177–178 (Indianapolis, Bobbs Merrill Co., 1943): "To a limited extent throughout the South there is a local use of hand-split hardwood shingles (locally called "boards") usually made from some species of oak, preferably the *Quercus acuminata*, which goes by the common name of shingle oak because of its adaptability to this use. The total hand-rived production is small, and it is one of the last remaining vestiges of the old handicraft processes." Here and there in East Tennessee one may still see an old roof of oak boards, with their ends cupped up, reminding one forcibly of Friesland ("Frizzly") chickens.

No one who has ever watched a shingle maker shaving a shingle can doubt that he takes a genuine joy in his work. The wood is straight grained, soft, and light, qualities that make white pine one of the most prized woods for interior finishing. Its lightness in particular has created the tremendous demand during the recent war for white pine for boxing and crating. When to these qualities is added another quality, that of durability, white pine becomes a superb wood for shingles. As evidence of the durability of the shaved shingle made from virgin white pine, this chronicler offers a single instance. Our house was covered with such shingles in 1874. Forty years later the roof was still perfectly good so far as its main purpose was concerned; only the exposed butts of the shingles had become weathered and frayed. Second-growth white pine was said to be not so durable. Maybe some dendrologist can explain the reason.

As for the softness of the wood, there was never a man in all that country with a sharp pocketknife who did not love just to whittle a white-pine shingle. To see a man sitting on a nail keg on the store porch or beside the stove inside the store whittling a white-pine shingle was to see a man who, for the time being at least, was in love with life. Or, if you care to go back into the mountains for evidence, to see a man sitting on his own doorstep calmly shaving a shingle while waiting for the doctor to arrive, or the baby, was to learn what power for sweetness as well as for light lay in a sliver of white-pine wood.

There was a certain preacher, so the story goes, who composed his sermons while whittling a shingle; and so powerful was his oratory that he could shake sinners out of their shoes and make them feel that they were hair-hung and breeze-shaken over the pit; but, when white-pine shingles were no longer to be had, he lost in great measure his power to convict and convince. In another, but closely related domain, the shingle played its part in behalf of righteousness and the good life. Most parents kept one or more neatly shaped paddles (in or about the same repository where they kept the bottles of paregoric and castor oil) expressly for the promotion of family discipline. Who of our community brought up in the era of the white-pine shingle does not have a sharply etched memory of such a paddle?

The shingle maker, as he drew his sharp drawing knife through the soft wood and watched the shavings gracefully curve and fall at his feet, knew in his soul what it was to enjoy life, liberty, and the pursuit of happiness. Gentle thoughts floated down to him from where the top of the tree used to be, or from far beyond, and, though he might not be a preacher or a speaker, or even a plain argufier, he felt the inspiration to expound and exhort. At least he could, and often did, compose the soft answer that turneth away the aggravating wrath of a wifely scolding. Indeed it is averred that the most irascible of tempers, given a sharp knife and a white-pine shingle, became subdued to the gentleness of a zephyr.

As a craftsman the shingle maker had to make a good shingle. However varied the width, the shingles must be of uniform thickness at the butt, must be shaved on both sides to a smooth even finish, and must be tapered evenly to the sixteenth of an inch at the other end. The edges likewise must be straight and true. A story has come out of the Maine woods that a good shingle shaver could toss a shingle into the air and shave another before that one came down.[14] That kind of a shingle, with a lick and a promise, might have been good enough for Maine, but our folks would not have used it for anything but a chicken house, and even then they would have felt that they owed an apology to the chickens.

My own first introduction to the shingle business was at almost the identical spot at which I had first encountered the new railroad. Our house was about half a mile from the Big Creek depot and hard by the road over which all traffic from up the valley and out of the mountains had to pass. About a mile above us branch roads led off to the west and the south, and 3 or 4 miles farther up the creek the road branched every which way. The road along the creekside was as rocky a road as it was ever the lot of wagon wheels to roll over. In fact, the soil of those creek bottoms is as tightly packed with boulders large and small as a primeval glacier and the age-long wash of waters could pack it. The rumble of one wagon over that road could be heard for a mile or more; the rumble of a dozen was like the approaching battle of Waterloo.

[14] Richard G. Wood, *A History of Lumbering in Maine, 1820–1861*, p. 174 (Orono, 1935), mentions that the shingle maker was called a "shingle weaver." Others, however, speak of the term as applied to the process of bunching or bundling, the "shingle-weaver" being the person who bunches the shingles. The term was never used in our country. See also James Elliott Defebaugh, *History of the Lumber Industry of America*, 2:89 (Chicago, 1907).

Not infrequently, from whatever part of the forest region they came, a dozen, or maybe two dozen or more, wagons loaded with shingles came lumbering and rumbling by our house one right after another. It was just such a rumble that one morning caught the ears of the small boy playing in the back yard. Increasing in intensity as it drew nearer, the noise became more than the chugging of heavy wagons over a rocky and uneven road. There were overtones of harsh voices giving commands to the oxen that drew the loads. The small boy scampered to the roadside to peer through the crack of the fence.

The progress of a yoke of oxen from one place to another, when drawing a load, is notoriously slow. I have sometimes thought in later life that they must put the snail to shame. Away up the road I could see them coming, raising dust and making a lot of noise, and, after a long time, there was one wagon and team, with their big load of shingles, right there before my eyes, while behind it as far as I could see came other wagons, all drawn by yokes of oxen. What a wonderful sight it was! Never in after years did I look upon a parade of elephants, zebras, camels, and other strange beasts with a greater thrill, although I could scarcely "hear my ears" for the jumble of noises, which now included the creaking of wheels on ungreased axels and the straining of the big bunches of shingles on the hickory withes with which they were tied to one another and to the wagon.

Some of the drivers, as they passed, said "Howdy, Bud," and some of them winked at me. And probably the next breath would be used in saying things to the oxen—like as not in monosyllabic explosives. As the days and weeks went by I gathered in a lot of vigorous old Elizabethan English through that crack in the fence, words that I would never have learned from either Smith's or Pineo's grammer, or even from Webster's school dictionary.

It was not just oxen under a yoke and pulling a wagon that stirred me to gaze and to wonder. It was those long caravans of oxen under the yoke straining at their heavy loads of shingles, sometimes with women and children scrooched on top of them, and the rough bearded drivers, raucously calling their commands to the oxen, or jawing back and forth to one another, that gave me a never-ending thrill.

One day when, from my private box in the grandstand, I was watching a train of wagons go by, I saw a sight that to me was almost as astounding as if I had beheld an elephant or a camel drawing an oriental chariot. Trailing along behind the ox teams, with their heavy creaking wagons, was a single ox, a little muley ox, a scrubby runt of a thing that scarcely looked as if he belonged to the cattle breed. I had seen a muley before, for once there had been one on our farm, though not for long. No self-respecting farmer would suffer a muley, the most despised of the cattle kind, to remain on his premises any longer than might be necessary to beef him, to sell him, or to give him away. The horned cattle seemed to feel the same way about it. To be hornless was not only a disgrace but was often regarded by the herd as a capital offense. If, therefore, the farmer himself failed to remove the muley to a safe place, that abominated scrub, that low-bred outcast, was likely to be eliminated by a well-directed thrust of a contemptuous horn. Yet right there before my eyes was one of these outcasts, looking for all the world as if he were ashamed to be seen in the society of respectable oxen.

What was also astonishing to my eyes, the muley did not wear a yoke but was harnessed somewhat after the manner of a horse—as nearly as could be, considering the way he was made; and he was drawing a small wagon, the least wagon by far that I had ever seen on the road, one that even to my young eyes appeared to have been very crudely made. Moreover, on the wagon were two quarter-bunches of shingles, bunches only half the size of those on the big wagons. Ox, wagon, load, and all were on a diminutive scale. Even the driver, as the picture now rises before me, was but a runt of a man. Logic and the fitness of things required that he should be; therefore, to every slithering skepticism respecting the correctness of my memory, I say, avaunt! In these latter days, when some of the muley tribe have become "high-caste" cattle, taking their places amongst the aristocracy of the bovine race, and the nice smooth horn in which the farmer once took such pride has itself come under condemnation, I sometimes wonder whether the muley of that earlier generation, if he could have envisioned this transformation, would not have faced his frowning world with confidence and courage.

The shingle makers sold their shingles to the Big Creek storekeepers and took in exchange such goods as they desired or were obtainable. Cash transactions were almost unknown. Money was

so scarce that even the fairly well-to-do often had difficulty in paying their taxes. Almost the entire business of the stores was done by barter. The entire value of the shingles might be taken up at once, or credit might be entered on the store's books, purchases to be made from time to time as desired. Perhaps oftener than otherwise it was the other way about. The shingle maker purchased on credit and later paid the account in shingles, sometimes supplemented by eggs, feathers, and chickens.

A few years ago a fire destroyed a set of store accounts covering fifty or sixty years. Among those lost books was one of exceptional character. One of those storekeepers, Swan L. Burnett, a generous soul, gave credit over a long period to a good many people from whom he had little or no expectation of ever receiving pay, although every now and then, as he has told me, he had occasion to draw the book forth from its hiding place in his safe to enter an unexpected payment. It was labeled the "S. A. Book," those being the initial letters of two short Anglo-Saxon words, customarily used in our neck of the woods to designate a worthless person.

The storekeepers found good markets in towns and cities within reach for all the shingles that the country could furnish. Knoxville was, naturally, one of the principal markets, although many carloads went to Chattanooga and beyond. In fact, Chattanooga once figured in an episode that juts out like a rugged promontory in the story of Big Creek and its shingle business.

For a long time freight rates for carload shipments were specific, without regard to the size of the car. Accordingly the bigger the car the more shingles could be shipped for a given sum. At first that made little difference, as the standard car had a capacity of only 20,000 pounds. Before long, however, cars carrying 30,000, and a little later, 40,000 pounds, came into use. The introduction of cars having a 60,000-pound capacity came later.

Suddenly my kinsman, Swan L. Burnett, began to find that deductions were being taken from the proceeds of his shipments on account of extra freight charges for excessive weight. The railroad company, having fixed the maximum carload, was weighing cars in Chattanooga, a hitherto unheard-of practice. Thereupon my kinsman decided to utilize the river for transportation. The one obstacle was the falls, 5 miles down the river, but he convinced himself that a raft could be constructed which, under proper guidance, could be made to shoot the principal channel successfully. The raft was built accordingly and loaded with shingles, the equivalent of several carloads, a crew of men signed on, and a certain Sunday morning was set for the launching.

The crew numbered, as I remember, some eight or ten men. I distinctly recall that the captain was William ("Bill") Moore, a hustling lumberman, who lived up the creek a few miles. My friend, J. W. D. Stokely, has supplied the names of five others of the crew: William Cannon Bryan,[15] a neighbor of Moore, Daniel Evans, William Murphy, Millard Robinson, and Scott Westall, all dwellers in the hill country. The names of the others appear to have been lost beyond recovery. Whether there was a first mate, second mate, or bos'n I know not.

The launching was on a Sabbath morning and at about the hour for services in the nearby church. There were, as may well be imagined, those who, because of this profanation, were inclined to prophesy the failure of the expedition, if not some dire disaster. But they were not blatant about it, and the local church remained absolutely empty. There was plenty of piety in our community for all practical purposes, but our folks were not prone toward the pietistical. The assemblage that gathered on the riverbank would have filled three churches to capacity and then spilled over. Every-

[15] Of the crew Bryan was the only one who subsequently "made history," and that was not naval history. He had a post office named for him. You would never guess its name, and even when I tell you it was Punkton you would still never guess why. The tale is of the following tenor. The man carried on his shoulders a very large round head, from which most of the hair had disappeared in his early manhood. "Punkin Head," somebody jibed, whereupon everybody began to call him "Bill Punk," a name that he was soon taking in his stride, without grumbling, if not with pride. Time came when a post office was to be set up in Punk's community, and the Post Office Department in Washington called upon the postmaster at Big Creek to recommend a name for it. The postmaster, who happened to be the same Swan L. Burnett who had fathered the project of rafting shingles to Chattanooga, recommended Punkton. Thus it was that Bryan left his footprints on the sands of time. To be sure, he made other small segments of local history, but it is not now meet to record them.

W. V. Jones thinks that Charles S. and L. D. Goodnough built the raft, though they did not sign on for the voyage.

body who lived at Dry Fork or Slabtown was there, for most of the crew came from up that way, and their families and friends had to bid their brave men good-bye as they departed on their long and hazardous journey. In fact, all up and down the river and the two big creeks and their forks, prongs, and branches as well, people were obedient to the urge to look upon one of the rarest sights ever offered them. That journey through treacherous waters to far-away Chattanooga was as dramatic, as romantic, as was the voyage of a clipper ship from Old Salem to China.

At length the raft was pushed from the shore and began to float gently down the stream. From the shore many voices shouted "Good-bye, Bill!" "Good-bye, Dan!"—and all the rest of them—and hands and hats were waved in farewell. From the raft came crisp good-byes and hurried glances toward their folks, but most of the crew were too deeply absorbed in their immediate tasks even to turn their faces toward the shore. Watching the scene were women with anxious faces. Even as a small boy, to whom the whole thing was only a show, though a rare one, I sensed that anxiety. For a few minutes the raft floated smoothly as the men aboard pushed and guided it with poles. Then suddenly it stopped. It had stuck on a rock bar or shoal. Evidently the heavily loaded raft drew more water than had been expected, for the existence of the shoal was well known and had figured in all the calculations. The raftsmen tried with might and main to push the raft farther out into the river where the water was deeper, but in vain. Thereupon the captain gave a command, and every member of the crew, including the captain himself, leaped into the river. Not being even fresh-water tars, not one of the crew, I am sure, responded with an "aye, aye, sir," but they did obey without a moment's hesitation. They shoved their poles under the raft where it had grounded and lifted with might and main. Again and again they tried, pausing now and then to get their wind, but nothing happened except that one end of the raft settled more and more firmly on the river bottom, while the other sank deeper and deeper into the water. They began to try first one device and then another. Probably not one of them had ever had an hour's experience in rafting; and being up-creekers probably none of them had had much, if any, experience with a ferryboat. From what I saw of rafting many years later on the Kentucky River, I am convinced that a crew of experienced Kentucky River raftsmen would have gotten that raft off the shoal or more likely would never have grounded it in the first place.

All day long, nevertheless, the raftsmen did not relax their efforts, except for intervals of needed rest. At noon the crowd on the shore thinned out somewhat but came flocking back after hurried dinners, although for the majority dinner was too far away. The present chronicler did not have far to go to gulp down some sustenance but speedily trotted back to the riverbank and the crowd of onlookers. All through the afternoon the struggle went on. Meanwhile distant dwellers, by ones and twos and threes, took their reluctant departures. About sundown, entirely unconscious of the fact that I was destined to become the sole historian of the affair but acutely conscious of a duty to bring up the cows, I painfully dragged myself away. I yearned mightily to see that raft go floating freely and smoothly on the slow current until it disappeared in the bend of the river. But even if it should be loosened from the shoal before dark, there was not the least likelihood that the ticklish plunge over the falls would be risked until daylight.

Early the next morning I hastened back to the scene. The captain and his crew had departed, the crowd had melted away, and only one or two other early risers had come to take a look. One end of the raft still rested firmly where it had grounded on the troublesome shoal, while the other end appeared also to have sunk to the bottom of the river, and what might be called the after deck of the raft was awash. Whether the author of the scheme had passed the night tossing on a bed of chagrin I could not know. He was not given to weeping and wailing, but I have no question whatever that at that moment he was seeking what comfort he might from a gnashing of teeth.

A few days later a crew set to work to tote the shingles back to shore. It was no small task, for the toters had to wade a distance of 30 or 40 yards through water up to their waists. When, after a few weeks, the shingles had sufficiently dried, they were loaded aboard cars and shipped. The railroad got its extra freight money after all, and I imagine some of the railroad people got a lot of fun out of the incident. As for the shipper, a man never wont to harbor gloom or to nurse his wrath to keep it warm, he too, in due time, like the vigilance committee that apologized to the widow for hanging her husband by mistake, freely acknowledged

that the joke was on him. Although I am not able to date this incident, I am confident that it was after the shingle mill had pretty well driven the shingle shaver out of business.

The first shingle mill in the community was set up at Slabtown about 1880 by a man named John Marshall, an Englishman by birth. He had, I believe, lived in Massachusetts for a time and then at Knoxville, but he finally found his way into our valley and went into the lumber business. Traditions of Marshall's career in our midst still linger in the valley. Primarily a lumberman, he occasionally nevertheless occupied a pulpit, although whether licensed thereunto by any church I am unable to declare. His bent, as I recall, lay in the direction of exhorting rather than expounding.

Marshall's shingle mill at Slabtown was long operated by Charles S. Goodnough. A little later one was set up farther back in the mountains, at the place which came to be called Blue Mill. The latter was operated by L. D. Goodnough, brother of Charles S. Descendants of the Goodnoughs still live there. These shingle mills quickly doomed the shaved-shingle business. The shingle mill was to shingle shaving what the threshing machine was to the old-time flail on the barn floor.

By that time the better of the virgin white pines had been used up, so maybe, after all, the sawing of shingles meant progress. Sawed shingles, nevertheless, did not compare with shaved shingles in serviceability. The timber now available was inferior in quality, and little or no effort was made at the shingle mill to eliminate knots. A small knot at the thin end of a shingle made little or no difference, but any kind of knot at the end exposed to the weather might be fatal to a roof. A consequence was that the merchants had to break down a large proportion of the bunches of shingles taken in trade, sort out the defective ones, and rebunch those that were merchantable.

All in all, the business in sawed shingles flourished for a quarter of a century; then that too dwindled away. All the white pine that was fit for shingles had been used up, and it would be another generation before a new growth was ready for use. Much of this second growth has in recent years been converted into lumber, but few, if any, trees have attained the size or maintained the quality that the early shingle shavers found in such abundance and attacked so eagerly. Today, in the region where shingles were once the main source of livelihood, wooden shingles are a thing of the past. True, a good many roofs in the valley and in the hills roundabout still carry covers of wooden shingles, but the shingles are invisible, hidden beneath sheets of galvanized iron, or maybe of asphalt. As old Sam Singletree expressed it to me last summer: "This country used to live on shingles. We et shingles for breakfast, shingles for dinner, and shingles for supper; and in betwixt and between we whittled 'em, jist to pass the time. Now you couldn't find a shingle on all Big Creek, either to pass away the time a-whittlin', or to paddle a young'un."

THE EXPANSION AND DECLINE OF THE NONPARTISAN LEAGUE IN THE WESTERN MIDDLE WEST, 1917–1921

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The Nonpartisan League's ambition to expand into a national organization became apparent early in 1917 with the unfolding of elaborate plans for organizing the farmers of Minnesota. Many Minnesotans had belonged to the Grange, the Alliance, the Populists, and the Equity at one time or another, and the appearance of the League had the effect of reviving old political principles and giving to them a new significance. Expansion into Minnesota was facilitated because of the close ties between the farmers in the western part of the state and those in eastern North Dakota. A combination of political, economic, racial, and psychological ties likewise expedited the spread of the League into Wisconsin, Iowa, South Dakota, Montana, and other neighboring states.

The political campaign of 1918 got under way in Minnesota, as in North Dakota, with the staging of local meetings on February 22, Washington's birthday. Delegates named at these conventions were to meet in district conventions that were to nominate delegates to the state convention. Simultaneously plans were made to get out as

much of the vote as possible by staging whirlwind membership drives. Nothing was spared in organizing Minnesota. Two hundred and sixty Ford cars were purchased at a cost of $130,000; the most capable organizers were summoned from Colorado, Nebraska, South Dakota, Wisconsin, Iowa, Oklahoma, Kansas, Texas, Montana, and Idaho, some one hundred and fifty organizers being added to those already in the state. At one time Minnesota farmers were said to have been joining the League at the rate of a thousand a day.[1]

In the Minnesota primaries the League supported Charles A. Lindbergh, the "original lone eagle" and former Congressman who had represented the district around Little Falls, for governor. He was described as one who "never wore the corporation collar." In Congress he had voted against declaring war on Germany—an unfortunate act in view of the fact that the League had been accused of disloyalty. Lindbergh also was opposed by many Catholics against whom he had shown hostility. While a member of Congress, he had introduced a resolution asking Congress to investigate the political activities of the Catholic Church in America. He charged that Catholic prelates "in all lands and at all times have been the ally of oppression," inferring that "Big Biz" and the Catholics were closely allied.[2]

The League set out to gain control of the dominant party in Minnesota as it had done in North Dakota. As Minnesota elected the members of its legislature by a nonpartisan system, the League was not confronted with any party affiliation difficulties in endorsing its candidates. The League did no work in Minneapolis, Saint Paul, and Duluth, the three large cities of Minnesota; it endorsed no candidates from city districts.[3]

The opponents of Lindbergh concentrated on the election of J. A. A. Burnquist as the Republican candidate for governor. The candidacy of Fred Wheaton, the Democrat, never personally a strong contender, was further weakened by the open endorsement of Burnquist by several prominent Democrats and the support received by the Republicans from several bipartisan anti-League organizations. Of the latter the most prominent was the America First Association, formed in the summer of 1917. During the last week of May and the first week of June, the newspapers of the Twin Cities carried daily appeals to the Democrats to enter the Republican primaries "to save the State from Socialism," and with some degree of success. Old party lines already had given way to "a pro-League and anti-League grouping." Lindbergh had written a book "whose bungling expressions on the war came home to roost..., when published by the opposition during the campaign."[4] He was defeated in the primaries, but received 150,000 votes, or three times the number of members the League had in Minnesota at the time.[5] The results of bipartisan voting were obvious. The Democrats who had polled 93,112 votes in 1916 cast only 32,649 votes in the primaries, while the Republicans who never had over 200,000 votes cast in the primaries this time received 349,951 votes.[6] With the aid of labor the League nominated 80 out of 130 members to the lower house, and 42 out of 67 members to the senate. The League carried 30 counties, mainly those along the North Dakota border.[7]

The defeat of Lindbergh gave the advocates of a third party their opportunity, as the elements favoring such an alignment had gathered strength. Nominating petitions were circulated to place candidates in the general elections on a "farmer-labor" ticket.[8] Only three candidates, however, were so listed. D. H. Evans, a Populist, an old-time Democrat, and a banker, was named for governor; Tom Davis and Fred E. Tillquist, insurgent Republicans, were put up for attorney general and warehouse commissioner, respectively.

[1] *Nonpartisan Leader*, 6(9):11, 17 (Mar. 4, 1918); S. R. Maxwell, *The Nonpartisan League from the Inside*, 13 (St. Paul, 1918); James W. Witham, *Fifty Years on the Firing Line*, 101 (Chicago, 1924).

[2] Robert Kingsley, Recent Variations from the Two-Party System as Evidenced by the Nonpartisan League and the Agricultural Bloc, 29 (Master's Thesis, University of Minnesota, 1923); *Catholic Bulletin* (St. Paul), June 15, 1918 (leaflet in Minnesota Historical Society); Lynn and Dora B. Haines, *The Lindberghs*, 221–223 (New York, 1931).

[3] Kingsley, Recent Variations from the Two-Party System, 29.

[4] Austin P. Haines, "The Nonpartisan League and the Loyalty Issue," *New Republic*, 16:188 (Sept. 14, 1918).

[5] Herbert E. Gaston, *The Nonpartisan League*, 261 (New York, 1920).

[6] Kingsley, Recent Variations from the Two-Party System, 30–31.

[7] *Nonpartisan Leader*, 7(4):2 (July 29, 1918).

[8] Ray McKaig, "The Nonpartisan League and Its Independent Press," *Public*, 22:13 (Jan. 4, 1919).

But this eleventh-hour farmer-labor party failed. League nominees, who had claimed the majority of the districts in the primaries, were defeated in the general election. In the House the farmer-laborites mustered only 26 votes as against 105 for the opposition; in the Senate about 15 out of 67 senators voted with them, but of these the farmer-laborites had elected only 10.[9]

One result of the League's defeats was to impress its leaders with the need for more effective organization. The drive for a larger membership began shortly after the 1918 political campaign. Great emphasis was also placed on the need for more effective cooperation between labor and agriculture at the ballot box. In July 1919 the Working People's Nonpartisan and Political League of Minnesota was organized, absorbing various trade unions and other League sympathizers who were ineligible for membership in "the farmers league." This was the town and city branch of the League.

In Nebraska, as in Minnesota, the League was given an unceremonious reception. No candidates were put up for state executive offices, but attempts were made to elect legislative and county officers.[10] Even the powerful Nebraska Farmers' Union had passed resolutions the year previous strongly condemning the policies of the League.[11] One report had it that a Nebraska organizer "was taken by an armed mob, in the dead of night, to an island in the Platte River, where one end of a rope was tied around his neck and the other thrown over the limb of a tree. He was given his life only on his promise to sell his League automobile, give the money to the Red Cross, and himself enlist in the United States army."[12] Suit was brought against members of the state's council of defense which had ordered the League to cease organizing Nebraska and "had prohibited it from holding a State convention for the purpose of nominating a State ticket." The League charged the council with "'insisting that no new political parties shall be organized, but that the members of the League shall vote for either one or the other candidates of the two principal parties . . . .'" The case was finally compromised; the council promised to cease its opposition if the League withdrew its paid organizers from the state, secured a new manager, and ceased circulating copies of Woodrow Wilson's *The New Freedom*.[13]

In Kansas, the League did not consider entering the state elections until 1920, but it did indicate its preference for Governor Arthur Capper for United States Senator. Capper had shown his sympathies for the League when the Federal Department of Justice asked him to investigate charges of disloyalty by reporting that "the League was comporting itself in accordance to law and the war needs of the nation." This, probably, was partly responsible for Capper's carrying all of the 105 counties in the primary election. Again, when the League was required to present written references from two well-known residents to rent offices in Topeka, Governor Capper and Tom McNeal, editor of *Capper's Farmer*, came to its assistance.

South Dakota appeared to be more friendly to the League, but the vote received in the primaries by Mark P. Bates, a farmer, as its candidate for governor on an independent ticket was not very encouraging. The antagonism present in the other Middle Western States apparently did not exist there; and League meetings prohibited in Minnesota were frequently held across the state line in South Dakota.[14] Early in 1918, the League made known the fact that it was not prepared to enter the Wisconsin campaign until the elections of 1920 and gave free sway to the independent farmer ticket led by the president of the Wisconsin Society of Equity.[15] In Iowa, the League claimed a membership of 15,000 in the fall of 1918 and also announced that it would not be ready for political action there until the fall of 1920. James M. Pierce, the publisher of the *Iowa Homestead*, was forced to resign his post as a member of the state council of defense because of his League

[9] Kingsley, Recent Variations from the Two-Party System, 30–32.

[10] Frank G. Moorhead, "The Non-Partisan League in Politics," *Nation*, 107:364–365 (Oct. 5, 1918).

[11] *Nebraska Union Farmer*, 4(8):1 (Aug. 8, 1917).

[12] Moorhead, "The Non-Partisan League in Politics," 364.

[13] *Ibid.*, 364–365; Elmo Bryant Phillips, The Non-Partisan League in Nebraska (Master's Thesis, University of Nebraska, 1931). See also *Nonpartisan Leader*, 6(8):12 (Feb. 25, 1918).

[14] Moorhead, "The Non-Partisan League in Politics," 365; *Nonpartisan Leader*, 7(7):3, 14 (Aug. 19, 1918); *Wisconsin Leader*, Jan. 15, 1921; "Townley in Kansas," *Literary Digest*, 68(11):17–18 (Mar. 12, 1921); *Minnesota Leader*, Mar. 26, Apr. 9, 1921.

[15] *National Equity News*, 1(12):11 (Apr. 25, 1918); *Nonpartisan Leader*, 6(20):16 (May 20, 1918).

sympathies. In Montana, the League nominated 40 out of 95 members to the lower house and 14 members to the upper house.[16] Success was also claimed in organizing Washington, and particularly keen interest was shown in the Idaho campaign. Unlike the League in North Dakota which dominated the Republican Party, the Idaho League gained control of the Democratic Party and nominated H. F. Samuels for governor. Two Congressmen and two United States Senators endorsed by the League were also nominated, among the Senators endorsed being William E. Borah.[17]

The general election of 1918 made the League triumph of 1916 in North Dakota more secure.[18] All state officers were reelected with increased majorities; majorities were obtained in both houses of the legislature; two more Congressmen were elected; and League-endorsed candidates were elected to the supreme court and the railroad commission. In Minnesota and South Dakota, League candidates displaced those of the Democratic Party as the leading opponents of the Republicans; but in Idaho the League showing was not what its members had anticipated, its candidates being elected only to the offices of state treasurer and superintendent of public instruction.

League triumphs in several legislatures were registered, but in no case did the League obtain the majorities gained in North Dakota. In Minnesota, the combined farmer-labor forces in the upper house numbered 15 and in the lower house 36; in Montana 16 League members were elected to the lower house and 4 to the senate; in Idaho, 6 League-endorsed senators and 10 League-endorsed members of the lower house were elected.[19]

Now that the League had captured complete control of North Dakota, it was only logical for it to seek to pass the industrial program which had been blocked by the conservative senate in 1917 on the theory that the state lacked the constitutional authority to engage in industrial activities.[20] The new legislature immediately busied itself ratifying all the proposed constitutional amendments required to obtain the constitutional authority needed.

Correspondence exchanged by Arthur Le Sueur, legal counsel and personal adviser to A. C. Townley, and Frederic C. Howe, writer and exponent of progressive legislation and platforms, throws light on the procedure used in the early stages. On April 22, 1918, Howe wrote to Le Sueur that he was expecting "to begin gathering material for the legislative program of the League early in May."[21] Howe was planning to acquaint himself with "the material in the libraries" and then "go to the country in order to get away from the distractions of the city, and. . .remain there for a considerable time familiarizing [himself] with the . . . achievements of Australia, Denmark and some of the more progressive legislation of our own states." He added:

> The underlying idea I have in mind is the economic and political freedom of the state not only from exploiting but from the unnecessary distributing agencies that now control the economic and the political life of the state.
>
> This involves shifting distribution to the producers, acting either through political or cooperative agencies. It also involves shifting political control to the producers. In other words, I have in mind a producers commonwealth in which privilege in all of its forms will be either exercised or reduced to a position of service within the state.
>
> In so far as it is economic it should, in my opinion, where possible, be worked out along quasi-cooperative rather than state-socialistic lines in order that the program will not be jeopardized with every election.
>
> I should not be so fearful of state socialism if the political machinery were better adjusted to our purposes or if the producing classes had more cohesive training, as they have in some European countries. In addition, there are substantial ethical reasons for emphasizing the cooperative as opposed to the state-socialistic motive.

On July 8, 1918, Le Sueur informed Howe that Townley had agreed that "we should have some of your time to aid in working this out" and

[16] *Nonpartisan Leader*, 7(13):4 (Sept. 30, 1918).

[17] Moorhead, "The Non-Partisan League in Politics," 365; *Nonpartisan Leader*, 7(5):8–9, 14, 8(12):3 (Aug. 5, Sept. 23, 1918).

[18] For a vote tabulation, see North Dakota Dept. of State, *Legislative Manual*, 1919, 283.

[19] *Nonpartisan Leader*, 7(21):4 (Nov. 25, 1918).

[20] Gilbert W. Cooke, The North Dakota Industrial Program, 17–18 (Ph.D. Thesis, University of Wisconsin, Madison, 1936).

[21] F. C. Howe to Arthur Le Sueur, Apr. 22, 1918, in Minnesota Historical Society. All letters cited hereafter are in this depository except as noted.

described the Howe plan as "a very comprehensive outline for work; I think more comprehensive than we would care to tackle at this time."[22] League officials, according to Le Sueur, inquired "when and how much time you can give us... what we want of Mr. Frederick C. Howe is that he recognize the fact that...he is one man in the United States who can and ought to be of tremendous service in carrying out the practical program that we are driving at....Mr. Townley has assured me that even if we have to sell our hides to cover the cost it must and will be covered and tell you to come."[23]

Despite the efforts made to obtain the aid of Howe, it became quite apparent in subsequent correspondence that he had become involved in other reform projects and was not instrumental in drawing up the final plans for the League's industrial program. Generally speaking, the legislation of the League was framed by attorneys and others in its employment. These men acted in the same capacity as did the legislative representatives of the Canadian government in the provinces. The men employed in shaping the legal and economic phases of the industrial program were W. G. Roylance, a former college professor; William Lemke and W. A. Day of the legal staff of the League; A. C. Townley; and Walter Thomas Mills of California, a League lecturer.[24]

The League's industrial program was passed in its entirety by the 1919 legislature. The legislation provided for the establishment of an industrial commission to head the state industries, the organization of the Bank of North Dakota to finance the industries, the construction of a mill and elevator and cheaper homes for farmers and laborers, compulsory state hail insurance,[25] authorization for an experimental creamery, exemption from taxation of all improvements from the general property tax, the issuance of ten million dollars in bonds for rural credit loans, plus bonds for financing the state bank and the state mill and elevator. The industrial commission, the all-important agency empowered to direct the entire industrial program with the exception of the hail insurance plan, was an ex-officio body composed of the governor, the attorney general, and the commissioner of agriculture.[26] Particularly powerful was the governor who had "full" veto power over any act of the commission.

The League had no intention of levying new taxes to begin the new industries. Each industry was expected to finance its own way; the credit of the state was to be used to indorse the industrial bonds of each industry authorized to begin business, the purpose of this credit plan being to provide each industry with money when it was needed. It was maintained that thousands of small businesses were put out of business by the larger concerns, not merely because these larger concerns were operated on a sounder basis or were able to operate more safely from the business standpoint, but because the larger concern was a more profitable customer of the bank and hence more likely to receive a loan.[27]

Opposition to the industrial program came from two directions: from former League members who had rebelled against the leadership and policies of the organization, and from the traditional foes of the League. One of the most outspoken foes of the program was Arthur Le Sueur, former adviser to Townley and League "brain truster." Similar opposition came from W. G. Roylance, another ex-League adviser.

Le Sueur, in attacking League policies and leadership, outlined the procedure followed in placing the industrial program in operation. Le Sueur

[22] Arthur Le Sueur to F. C. Howe, July 8, 1918.

[23] *Ibid.*, July 23, 1919.

[24] Cooke, The North Dakota Industrial Program, 18.

[25] See Gilbert W. Cooke, "North Dakota Hail Insurance, 1911–36," *Journal of Business*, 11:277–307 (1938).

[26] Cooke, The North Dakota Industrial Program, 19–20. The main provisions of the act were as follows: " 'Manage, operate, control, and govern all utilities, industries, enterprises and business projects, now or hereafter established, owned, undertaken, administrated or operated by the State of North Dakota, except those carried on in penal, charitable or educational institutions. To what end it shall have the power, in the exercise of its sound judgment is hereby directed: (a) to determine the location of all utilities and industries. (b) to acquire by purchase, lease, or eminent domain all necessary property rights, and to equip, maintain and repair and alter same. (c) to employ a manager and all help for each utility. (d) to remove and discharge all persons when the public interest requires it. (e) to fix the buying price of all things bought and the selling price of things sold. (f) to make rules, regulations, and by-laws for all industries. (g) to procure the necessary funds for such industries, by negotiating the bonds of North Dakota. (h) to conduct investigations on all matters connected with the industries.' "

[27] *Nonpartisan League; Origin, Purpose and Method of Operation, War Program and Statement of Principles*, 16.

and Roylance had gathered "data of state-owned and operated industries from the ends of the earth" and prepared "legislation for carrying [the] ideas. . .gathered from this research." This was completed by November 1918 and submitted to League officials for consideration in the early part of December 1918.[28] "The policy followed in drawing up this legislation for the establishment of the bank and the mills and elevators," according to Le Sueur, "was to *Take These Institutions As Far Out of Politics As Possible.* When these bills were turned over to the officials of the League for study and suggestion, objections were brought out, and other bills based upon an exactly opposite policy were drawn up. . . . The policy was *Keep The Bank and The Industries Tied To Politics For The Sake of Political Success.*" It was not called that but referred to as "political exigencies." These industries could have been operated either through the "political state" or through the industrial commission; in practice they were managed by a political body, the industrial commission.

Le Sueur pointed out several weaknesses in the industrial program as finally organized, among the foremost being that it would make for "instability." A League defeat in the elections would place the entire program in the hands of its enemies who would lose little time in emasculating it. A shift in opinion on the part of a small group of a fickle electorate could change the whole industrial policy. In short, there would be "no stability, no sense of confidence in the future of the enterprises, a condition which is absolutely essential to industrial building." American political psychology would make it difficult to retain a friendly administration in office for more than two or three terms.[29]

Another shortcoming was that further inefficiencies would result from the standpoint of management. The three members of the industrial commission had very wide powers granted them not because of their proficiency but merely because they happened to hold ex-officio offices. The men serving on the commission were also ex-officio members on other state bodies—the banking board, the board of education, and the workmen's compensation board. These men did not carry on active management of these enterprises but employed "experts for that"; yet the other duties were important, "and their time and energy have limits." It was impossible for the commission to make contracts for longer than two years, while the political character of the administration would tempt it "to lay the blame for any failure on the hired managers." As set up, the commission could discharge "at will with or without cause," the result being the erection of "a powerful political machine" and "the attendant evils of the spoils system, bureaucracy, and incompetency." For example, the majority of the industrial commission which operated the bank also comprised the banking board to which reports of the bank's activities had to be made.[30]

The greatest opposition to the League came from the traditional foes of the organization who capitalized greatly on the arguments of Le Sueur. First, they resorted to the courts, and finally to the press and the ballot box. An injunction was obtained to prevent the floating of the bond issue, but the state supreme court in Green *v.* Frazier held that the laws in question provided "'an ample and complete method for the payment of both principal and interest of the bonds . . . and are in entire harmony with the provision of Article 182 of the Constitution as amended . . . .'"[31] In the case of Langer *v.* Hall, the court decided that the bonded indebtedness of the state could be increased, stating that "'the state could issue $2,000,000 of bonds in excess of the existing debt and that they would be within the debt limit'."[32] In Sargeant County *v.* State, the court held that "'the Bank of North Dakota, as an agency of the sovereign power engaged in the banking business, has a distinct status separate and apart from the state itself; this status permits it to function as a distinct and separate agency of the sovereign power.'"[33] Another suit filed in the federal district court, the suit of the "forty-two taxpayers," charged that the industrial program was a deprivation of their property rights under the fourteenth amendment of the Federal Constitution. The court, presided over by Judge Charles F. Amidon,

[28] Arthur Le Sueur's manuscript on the industrial program, Nov. 30, 1920, in the Minnesota Historical Society.

[29] Arthur Le Sueur, "The Nonpartisan League: A Criticism," *Socialist Review*, 9:193 (November 1920). Le Sueur was officially connected with the League until April 1919.

[30] *Ibid.*, 194–195. See also *Grand Forks Herald*, Dec. 30, 1919; Oscar Anderson to Arthur Le Sueur, Dec. 26, 1920; Wallace Campbell to Le Sueur, Dec. 24, 1920.

[31] Cooke, The North Dakota Industrial Program, 21.

[32] *Ibid.*, 22.

[33] *Ibid.*, 22–23.

supposedly a League sympathizer, held that the industrial program was not a deprivation of property rights.[34] This decision was frequently cited as legal evidence that the League program was constitutional.

The failure to crush the League program by court action did not deter the opposition from making preparations for the elections of 1920. Dissension within the League provided the opposition with much needed ammunition and did the League irreparable damage. Among the revolting leaders were M. P. Johnson, former president of the North Dakota Society of Equity, and Theodore G. Nelson, "two-bit Nelson" according to his enemies, former president of the grain growers department of the American Society of Equity and an important factor in the early activities of the Equity Cooperative Exchange. These Equity men had been more interested in the cooperative movement than in the industrial program of the League, but they were swept into the League columns by the first flush of enthusiasm. Opposition organizations like the Good Government League, caricatured as the "Goo-Goo League" by League leaders, and later by the Independent Voters' Association, furnished most of the opposition in the general election of 1920 and especially in the recall election of 1921.

"The real revolt against the League's hierarchy came in 1919, when the attorney-general, William Langer, the state auditor, Carl Kositsky, and the secretary of state, Thomas Hall, raised the standard of revolt. All of these men had formerly been members of the League and had been elected by its suffrage. Even since their rebellion they have never claimed to be opposed to the organization as an organization, nor have they at any time renounced their allegiance to its original industrial program."[35] Their two chief arguments of opposition were the mismanagement of funds and the growing burdens of taxation. Once again it was demonstrated that the League program was acceptable, even though its leadership was not.

Another unfortunate development from the standpoint of the League, and one which was used by both sides for all that it was worth politically, was the Scandinavian-American Bank case.[36] The Scandinavian-American Bank of Fargo, a North Dakota corporation, used primarily as a financial agency for the League and its subsidiary organizations prior to the establishment of the Bank of North Dakota, among other things had loaned money to the League on postdated checks which the organization had accepted in payment of membership dues. The Scandinavian officials, it was asserted, repeatedly had refused an audit of its books, but an examination was finally ordered by the board of bank examiners, two of whose three members were the disaffected League officials, William Langer and Thomas Hall. The examination revealed that "the bank had some $75,000 in post-dated checks among its assets," had exceeded its authorized loaning limit, and was totally insolvent. As a result, the bank was ordered closed and a receiver appointed. League officials immediately sought to rally the aid of the farmers to the bank and succeeded in so doing; yet the fact remained that this was but another link in the chain of blows that led to the collapse of the League.

More trouble was in store for the League in the elections of 1920, its disaffected leaders causing no end of trouble. William Langer, in seeking the Republican nomination for governor, came within a few thousand votes of defeating Lynn J. Frazier, whose strength was largely in the eastern and more prosperous counties. Two other revolting members, Carl Kositsky and Thomas Hall, were nominated for state auditor and secretary of state. The opposition also nominated John Steen, a Republican, as state treasurer, and two others for the railroad commission. Majorities were won by A. M. Christianson for the supreme court, and for Minnie Nielson, candidate for superintendent of public instruction. Indications also were that the conservatives were to gain control of the lower house of the legislature. Dr. E. F. Ladd, the League candidate, defeated Ansel J. Gronna for the nomination as United States Senator, despite the fact that Gronna was a member of the League. Gronna's defeat also brought dismay to the progressives.[37]

In Minnesota, it appeared as though the League finally was to have its day. The primaries gave J. A. O. Preus, the Republican, 44 percent of the total vote, and Dr. Henrik Shipstead, the Non-

[34] *Ibid.*, 23. See also Scott *v.* Frazier, in *Federal Reporter*, 258:676 (St. Paul, 1919); and Hugh E. Willis, "North Dakota's Industrial Program and the Law," *Survey*, 45:418–419 (Dec. 18, 1920).

[35] Andrew A. Bruce, *Non-Partisan League*, 200 (New York, 1921).

[36] Gaston, *The Nonpartisan League*, 303–312.

[37] Bruce, *Non-Partisan League*, 212–213.

partisan nominee for whom an airplane campaign was conducted, 41 percent.[38] The other four candidates obtained the remaining 15 percent. League strength was largely confined to "the new, sandy, and sparsely settled counties," while "the older, more prosperous, and better-cultivated counties" were still found in the conservative column.[39] Nonpartisans were successful in Montana where they nominated their candidate for governor in the Democratic primary. In Wisconsin and Colorado, their candidates were nominated on the Republican ticket.[40] The strength of the League in Wisconsin, as expected, was due largely to the La Follette movement rather than to the League itself; there the League was merely La Follette Progressives dressed in new political attire.

All signs pointed to a return to power of the conservative forces in the fall elections. In Minnesota, the conservative triumph was decisive. The Republicans, despite the close call experienced in the primaries, defeated Shipstead, the remainder of the League candidates for state offices, and even elected their candidates to the supreme court. The conservatives were assured of complete control of both houses of the legislature. It was claimed that the women who had recently obtained suffrage were largely responsible for part of the poor showing made by the League. A shrewd move on the part of the Republicans was their pledging support to the cooperative movement. This probably played an important part in dividing the votes of the farmers. The loss of Minnesota was a serious blow to the League for it had hopes of capturing the solid farmer vote, the vote of the labor unions, the Socialists, and other radical Minnesota elements. The gubernatorial candidate of the Working People's Nonpartisan League had withdrawn for the purpose of presenting a united front in support of Shipstead. From all appearances the Socialists of Minnesota delivered their votes to the League.

In Montana, the League, despite its success in nominating its candidate for governor on the Republican ticket, was defeated in the final election by a coalition of Republicans and Democrats. In Colorado, the same experience was encountered; but in South Dakota in a three-way race between Republicans, Democrats, and Nonpartisans, the League finished second. Wisconsin received much attention, but the success there of J. J. Blaine and the remainder of his ticket was more of a Progressive than a League triumph.

In North Dakota, particularly stiff opposition was met in returning Lynn J. Frazier to the governor's office. The regular Republicans had agreed to support the Democratic candidate, J. F. T. O'Connor, who came within 4,630 votes of defeating Frazier. The opposition was successful in electing their candidates for superintendent of public instruction, secretary of state, state treasurer, a justice of the supreme court, four out of six district judges, two members of Congress, and enough members in the lower house of the legislature to control it. Control of the upper house by the conservatives was lost by one vote. Important to the League, however, was its success in securing the passage of ten initiated measures it had sponsored. The triumph of Dr. E. F. Ladd, League candidate for United States Senator, was attributed chiefly to his personal popularity and to the fact that he was running as a Republican in a Republican presidential year.[41]

By and large, the position of the League was becoming more and more insecure. The strong reactionary feeling that set in with the close of the World War unquestionably was one reason for the League defeats. Bipartisan combinations against the League furnished another reason. The failure of women to vote in sufficient numbers in rural areas and elsewhere where League sympathy existed also cost the League votes, as did the desire of the people to rebuke the Democratic Party. This antipathy cost the League votes where its candidates ran as Democrats. In several states the League supplanted the Democratic Party as the chief rival of the Republicans. Republican candidates in all states opposed by the League got smaller majorities and pluralities than did the remainder of the Republican ticket. On the basis of the gubernatorial vote, the League candidates in 1920 received more than 1,200,000 votes as compared with 230,000 in 1918.[42]

Meanwhile, a powerful new opposition force

[38] *Ibid.*, 214. For accounts of the airplane campaign, see *Minnesota Leader*, May 8, 1920; *Nonpartisan Leader*, 10(20):4 (May 31, 1920).

[39] Bruce, *Non-Partisan League*, 215.

[40] *Ibid.*, 213–215.

[41] *Ibid.*, 216–224.

[42] C. R. Johnson, "The Nonpartisan League Defeated," *Nation*, 111:614 (Dec. 1, 1920); Oliver S. Morris, "The Nonpartisan League," *ibid.*, 733 (Dec. 22, 1920).

known as the Independent Voters' Association had been making its strength felt against the Nonpartisan League in North Dakota. This association was the spiritual and organic successor of the Good Government League, the earlier short-lived opponent of the League. The association was organized in the summer of 1918 in Griggs and Steele counties for the supposed purpose of studying the problems of government. Work began at Cooperstown on December 9, 1918, and the organization was placed on a permanent basis at a conference held in Bismarck in January 1919. Toward the close of the legislative session, another state-wide conference was held; an executive committee was appointed, and the decision was made to place eleven of the measures passed by the legislature up to the people for a referendum vote. Seven of these measures were to be voted upon without change, while changes were proposed for the other four. The association also organized campaign committees in 43 of the 53 counties.[43]

In the elections of 1920, the Independent Voters' Association circulated a "voters' guide," sponsored chiefly by a Republican-Democratic-I. V. A. joint campaign committee that supported anti-Townley candidates.[44] Party lines were eliminated as far as possible; independent Republicans and Democrats were asked to bury the hatchet for the time being to present a "compact front against the particular brand of politics" known as "Townleyism." The association pledged itself "to the practising of greater economy, home rule by home people, loyalty to the state and nation, strict enforcement laws, stabilizing of credit and an equitable distribution of the tax burden by taxing all property wherever it is found in proportion to its value." Changes were proposed in the laws governing the Bank of North Dakota to "make it impossible not only to misuse the funds on deposit . . . but also to use the bank as a political club over political enemies and as a means to reward political friends." It demanded "a fair and unbiased examination of the bank's affairs by elected officials," for limiting the "real estate mortgage loans by the Bank of North Dakota to actual farmer residents," for the passage of legislation authorizing "the publication of all private legal notices affecting local property and people and their interests, in local papers thus giving the citizens of every country town and its tributary territory, a right to use local resources for the purpose of maintaining in their midst, one or more independent newspapers." A law also was asked for the restoration to the office of superintendent of public instruction of many of the records, duties, and powers that had been taken away from it by the board of administration.

The opposition to the League, having failed in its attempt to devise an original and alternative program, had accepted in effect a platform that approved the principles of the League, demanding a fair trial for the industrial program with some changes in the law and administration to make it " 'workable and efficient' " and to " 'drive the leaders of the League from the public crib.' " The acceptance of this program was given as an explanation for the I. V. A.'s capturing control of the lower house.[45] The I. V. A., despite its glowing promises, had made plans to emasculate the industrial program as its attack on the bond issue soon demonstrated. The $17,000,000 bond issue had been authorized by the legislature of 1917, but after having been attacked in the state and federal courts, was finally upheld as constitutional by the United States Supreme Court. A compromise agreement finally was arranged between the independents and the League, with the hope of helping the industrial commission dispose of the bonds; but the compromise was broken when a committee of bankers, who in consideration for financial aid, demanded that the state " 'not . . . enter . . . any more Socialistic enterprises,' " meaning in effect that the bank was to become nothing more than a rural credits institution. Failure to float this bond issue was immediately charged to the opposition of the I. V. A. Teigan wrote a fellow Leaguer: "The I. V. A.'s saw that if the deal went through and six million dollars of North Dakota bonds were sold their political prospects would not be any too rosy in North Dakota. Consequently the bankers refused to go on with the negotiations until things settled down . . . somewhat. Just when the settling down will take place I am sure I do not know."[46]

Shortly after the elections of 1920, investigations by senate and house committees followed;

[43] Independent Voters' Association, *Townleyism's Future in North Dakota*, 65 (Fargo, 1919).

[44] Independent Voters' Association, *The Voters' Guide*, 3–10 (Fargo, 1919).

[45] Oliver S. Morris, "What Is Happening in North Dakota," *Nation*, 112:367–368 (Mar. 9, 1921).

[46] H. G. Teigan to O. M. Thomason, Feb. 27, 1921.

the house committee dominated by the independents found some "minor irregularities" but nothing serious, while the senate committee controlled by the League found "the enterprises properly conducted." Especially menacing to the independents was not what the Bank of North Dakota was doing but what it was likely to do under its broad powers which included the power to establish branch banks and accept deposits. Meanwhile, the law initiated and enacted by the lower house making it optional for local government officials to deposit funds with the Bank of North Dakota was not helping the League any. This law meant that the League was to lose the funds of counties, cities, and school districts where officials hostile to the League had been elected. The bank ignored this act by failing to heed the demands of hostile communities for their funds, and some counties actually brought suit to collect. This, plus the refusal of the business interests to take the bonds added to "the financial stringency," as it came in a period of deflation, low farm prices, and repeated crop failures.[47] One observer noted: "Business in the State is disorganized and banks are getting into worse instead of better condition. The State industrial program is held up, and the legislature continues deadlocked. Political feeling is bitter and intense beyond description."[48]

The League charged that the failure of the bankers to receive assurances that the Bank of North Dakota would not extend its operations to include the broad powers granted it was forcing the independents to resort to more drastic measures. This was noted in the numerous obstructionist tactics employed. Attempts were made to force the resignation of William Lemke, the much-feared attorney general. Compromise measures were proposed intended to cripple the program. Laws were sought to make the legal deposit of public funds in the Bank of North Dakota equal only to its combined capital and surplus and thus make it impossible to give financial aid to the industrial commission. Another bill sought the appointment of the industrial commission by the governor instead of by the people. The industrial program was to be limited to the completion of the home buildings undertaken, and the mill and elevator under construction at the time at a total expense of $250,000 and $1,000,000 respectively. Finally, the bank was to be abolished after a period of liquidation.[49]

Opposition reached a climax in 1921 when a series of proposals were referred to the voters with a petition for the recall of the entire industrial commission. Five of these measures pertained to the industrial program, being by and large a crystallization of the obstructionist tactics pursued by the independents.[50] Real strength was displayed by the League opponents in what was the first recall election ever conducted in the country on a state-wide basis. The man groomed for the governorship by the independents was R. A. Nestos who had been seriously considered for the candidacy in 1920 but who had been passed over for William Langer with the hope that the ex-Leaguer would be successful in turning the tide against the League. Nestos was selected by the independents at a convention held at Devils Lake in March 1921, having been placed in nomination by J. F. T. O'Connor, the Democratic gubernatorial candidate in 1920.[51] Nestos, "a lawyer and Sunday-school leader of Minot," had been seeking public office for years; furthermore, he was a Norwegian by birth and came from the western part of the State which was predominantly Nonpartisan in its sentiments.[52]

Besides carrying the names of the candidates for the three major state offices, the ballots also contained six "initiated" measures which were backed by the independent forces and on which the voters were asked to vote "Yes" or "No." These six initiated measures called for the nomination and election of state and county officers without party designation, the nomination and election of congressional candidates and party committees, a public depository law, an amendment to the industrial commission law, a rural credits act, and the dissolution of the Bank of North Dakota. Three constitutional amendments were likewise submitted: one, sponsored by the independents, asked for a reduction of the state debt limit; the other

[47] Morris, "What Is Happening in North Dakota," 367–368.

[48] *Ibid.*, 369.

[49] C. R. Johnson, "The Struggle in North Dakota," *New Republic*, 26:43 (Mar. 9, 1921).

[50] Cooke, The North Dakota Industrial Program, 26.

[51] *Minneapolis Tribune*, Nov. 24, 1921.

[52] Oliver S. Morris, "The Vote of the North Dakota Farmers," *Nation*, 113:535–536 (Nov. 9, 1921); "North Dakota's Political Twister," *Literary Digest*, 71(4):12–13 (Oct. 22, 1921).

two, submitted by the last legislature, proposed to increase the salary of legislators to $500 a year and to consolidate the offices of county judge and clerk of court in counties under 8,000 population.[53]

The recall election, much to the surprise of the League, brought about the defeat of both Governor Lynn J. Frazier and Attorney General William Lemke. This League defeat meant the passing of control of all important boards, except the board of administration, to the independents. The independents had gained control of the industrial commission which controlled the Bank of North Dakota, the mill and elevator association, and the home builders association. Changes in the offices of governor and attorney general also shifted control of the board of school and university lands. The League, however, managed to retain control of the board of administration which was charged with the supervision of all state institutions, the only change on the board being the substitution of Joseph A. Kitchen, the new commissioner of agriculture and labor, for John N. Hagan, a League member.

Other boards and commissions passing into the control of the independents were the auditing board, the banking board, the depositor's guarantee fund commission, the board of equalization, the printing commission, the budget board, the motor vehicle registration department, the tax department, and the pool hall inspection department which, among other things, had become a valuable political institution of the League. Curiously enough the voters defeated all the initiated measures intended to destroy the industrial commission, but at the same time they elected a new commission opposed to the program. From then on the program was under the domination of the I. V. A., and it was not until 1933 that the forces which had fought for the program were placed in complete control of the state enterprises.[54]

The strength of the opposition was centered mainly in the eastern part of the state, and the reasons for the recall of the League officials were strikingly similar to those accounting for the League defeats in 1920, namely, the depression that was sweeping the country, the strength of the anti-League propaganda, the mistakes of the League officials in administering the industrial program, the general national trend against the party in power, and poor management of the campaign. Among the mistakes committed by the League were those revolving about the conduct of the home building association program and the losses accruing from operations of the state-owned mill. "Houses were built at a greater cost to the state than was permitted by law and as contracted for with the owners. Then, too, the small losses suffered by the state-owned mill at Drake did the League administration some damage." The losses suffered by the mill were said to have been due mainly to "the decline in the price of wheat during the last fourteen months. . . ." Other failures such as the Equity Packing Plant with large losses to the stockholders, and the failure of a number of co-operative stores organized by League members, no doubt, had influenced voters to vote for the recall of League candidates.[55]

Governor Nestos, in his inaugural address, repeated the campaign pledges of the independents to reduce state expenses and to seek to attract outside investors to North Dakota. He promised that his administration would proceed cautiously in its tasks; an immediate survey of the business of the state and the conditions of the industrial program would be made; state credit would be restored, the number of public employees would be reduced, and the Grand Forks state mill and elevator project would be completed. " 'It is the hope and purpose of the incoming administration,' " said Nestos, " 'to forget as far as possible the differences and discords of past campaigns and to view the present situation in the state calmly and dispassionately and with but one thought and purpose in mind, that of serving honestly the best interests of the citizenship of our state.' "[56]

There were other forces at work that were contributing to the disintegration of the League besides the Independent Voters' Association and the numerous reversals suffered in the management of League enterprises. Among these factors were the internal dissension already mentioned; the agricultural depression; the indifference of Senator

[53] *Minneapolis Journal*, Oct. 28, 1921; *Minneapolis Tribune*, Oct. 28, 1921; "North Dakota's 'Recall' Puzzle," *Literary Digest*, 71(8):10 (Nov. 19, 1921).

[54] *Minneapolis Journal*, Nov. 2, 1921; Cooke, The North Dakota Industrial Program, 26–27; H. G. Teigan, "Recalling the Farmer Governor," *Labor Age*, 10(4):9–10 (December 1921).

[55] See *Consumers' United Stores Company* (a pamphlet, Fargo, n.d.); Teigan, "Recalling the Farmer Governor."

[56] *Minneapolis Tribune*, Nov. 24, 1921.

Robert M. La Follette who, in all probability, looked upon the League as a rival to the Progressive movement and consequently to his personal leadership; the rise of rival farmer organizations that were helping divide and confuse the farmers of the Northwest; and the hostility of the Socialist Party to a lesser degree.

Liberal and radical groups have had a notorious record of open hostility and differences of opinion among themselves over the methods to be used and the goals to be sought, the case of the League being no different in this respect. The League from the very beginning was accused of being a Socialist organization, but the Socialist Party of America had other ideas and expressed itself very clearly on the League issue in a resolution adopted in the Saint Louis convention of 1917. The Socialist Party repudiated any attempted affiliation with the League on the ground that the latter was interested in acquiring political power for a " 'certain division of the industrial class of the United States,' " while "the historic mission of the Socialist Party was the economic emancipation of the working class." State Socialist organizations were warned not " 'to fuse or to compromise,' " and were urged to " 'maintain in the utmost possible vigor the propaganda of Socialism, unadulterated by association of office seekers. . . .' " Finally, the Socialists believed: "The Social Revolution, not political office, is the end and aim of the Socialist Party. No Compromise, No Political Trading."[57]

Other basic arguments were advanced against the League. The Socialist Party was interested in the welfare of city people as well as the farmers, but since the League consisted primarily of farm owners the interests of the League farmers were "in conflict with those of agricultural workers and their actions in the long run must be dictated by their interests." The League, in effect, it was reasoned, would be opposed to state insurance for agricultural workers, to old age and unemployment insurance, to fixing maximum prices on farm products, and to the compulsory sale of such produce. During the war, the Socialist Party said, League representatives in Congress succeeded in inserting in the Food Control Act minimum sale prices for wheat, so that the consumer would be compelled to pay at least $2.00 per bushel for wheat. Victor Berger, the Socialist Congressman from Milwaukee, in a speech delivered in Minneapolis early in 1920 reminded his listeners: " 'Did the Nonpartisan League by stealing the livery of the capitalist class [think] they could do something for the workers and farmers. Six men voted to seat me in Congress after I was elected by the workers. . . . The Nonpartisan cowards, Sinclair and Baer, voted to lynch me. I understand in St. Paul they elected another man, Keller, who also voted against seating me.' "[58] What more "conclusive evidence" was required to show that "the League program is not socialism"? Was the League not composed of rich farmers "thirsting for political power"? Did it not represent the "bourgeoisie" as against the "proletarian" movement? Did not the League have old and conservative aims? Would it not be found allied with reactionary political and economic forces?

Efforts were made to bring these groups together. Particularly active in this respect was W. C. Zumach, a Socialist who later went over to the Nonpartisan League in Wisconsin and who repeatedly attempted to arrange conferences between Socialist leaders such as Mayor Daniel W. Hoan of Milwaukee, Victor Berger, and others representing the League. Zumach wrote Teigan, the national secretary of the League, that he was pushing the "get-together" idea with the hope that as many Socialists as possible would be able to sit in with the Nonpartisans. "Of course I'll see to it that only the fellows with the right ideas will take part in the conference so that no time or energy will be dissipated," admitting however that there were still in the Socialist Party "a few 'nuts' that love to roll their 'R's' especially in the word revolution."[59] A meeting finally was arranged, but later events took a change for the worse when League Congressmen showed their antipathy or indifference to Berger by voting to expel him from Congress or by being conveniently absent when the vote was taken. Zumach expressed the views of the Socialists when he wrote Teigan: "But I'm disgusted with the showing of League congressmen on the expulsion vote. I'm heartsick for I see all hopes of getting together knocked in the head. I could not and would not ask our boys to make common cause with such representatives.

[57] *A Political Guide for the Workers*, 82–83 (Chicago, 1920).

[58] *Answering the Socialist Charge* (n.d.), a leaflet in Minnesota Historical Society.

[59] W. C. Zumach to H. G. Teigan, Oct. 15, 22, 1919; Teigan to Zumach, Oct. 23, 1919; H. G. Teigan to Martin Teigan, Oct. 26, 1919.

Do you expect that labor of Wisconsin will consider you people as safe guardians of their interests? Not if I know the Labor movement of Wisconsin. They knew the principles and issues involved in this fight and they are behind Berger.

"My God! how could these men vote to unseat Berger? Is not Townley in the same fix? Has he not been several times indicted? Has he not been found guilty of sedition and sentenced? Has not the League itself been branded by these same powers as disloyal, seditious, and everything else that is bad? I myself saw Congressman Baer driven from Rice County, Minnesota because he was branded as disloyal. Do these men hold these seats in Congress because they are considered safe by Big-Biz while Berger is driven out?" Zumach pleaded with Teigan to see to it that the League took a stand on this matter, if the Socialists and the League were to get along. "You simply must clean your house of this stain."[60]

Teigan replied that he did "not believe that we should conclude that a combination of forces in Wisconsin is impossible. After all the League organization in Wisconsin does not belong to us here at the National office, neither is it in any way responsible for the acts of a North Dakota congressman. All that we have done in Wisconsin, as in other states, is to build the organization. The farmers who have enlisted in the movement there own the organization after it has been built."[61]

The action of League Congressmen in helping unseat Berger was perhaps explained in a letter by Teigan to an inquirer of the League position on national issues. "The National Nonpartisan League has not concerned itself very much with National matters. In fact its concern with these things has been so small that at times we have forgotten about having representatives at the national capitol. As a consequence these men were never advised as to what was the desire of the organized farmers movements in the Berger matter. Thus, both Baer and Sinclair were left to act on their own initiative as in the case with them, on most other propositions that have come before Congress."[62] Later Teigan summarized the League relationship with the Socialist Party of America in a letter to Dr. F. Thoeneman of Kiel, Germany, in December 1921: "The Socialist Party . . . has not been particularly friendly to our movement although it is more so now than was the case some years ago. The good work done by the League in North Dakota and which was attempted by our legislators in other states had a rather convincing influence upon the Socialists as to the honest intentions, at least, of the League and its leaders."[63]

Although the opposition of the Socialist Party to the "opportunistic" program of the League was well known, the position of Senator Robert M. La Follette was not exactly clear. La Follette never had issued a clear-cut statement as to where he stood with respect to the League, yet his attitude on the organization was all-important. The La Follette movement was a psychological counterpart of the same forces that were crystallized into the organization of the League; furthermore, some of the most ardent admirers of La Follette were in the states in which the League had its largest membership. The stand of La Follette on the war at the conference of producers and consumers in Saint Paul in September had endeared him to the most ardent League admirers. Still his pronouncements there and elsewhere could not be considered as ipso-facto evidence that he had become an integral part of the movement. W. C. Zumach, the office manager of the Wisconsin branch of the League, probably had the La Follette forces in mind when he wrote to Teigan: "Various forces whom we have counted upon as our friends are becoming fearful of League power, and are interested in seeing the League relegated to a position of impotency."[64]

The La Follette forces in the fall of 1920, according to Zumach, "were under the impression that the League was plentifully supplied with money, and that we were in a position to put up a big campaign." Such, however, was not the case. "The League financially and otherwise was in a most deplorable position."[65] In the Wisconsin Senatorial race, certain Socialists and Leaguers sought the support of La Follette for Frank Weber, a Milwaukee Socialist leader and labor organizer, but with little success. The Socialist sympathies of La Follette were too well known. James Thompson, the La Crosse progressive, was his choice.[66] In October 1920 when an

[60] W. C. Zumach to H. G. Teigan, Nov. 14, 1919.
[61] Teigan to Zumach, Nov. 18, 1919.
[62] H. G. Teigan to O. E. Smith, July 7, 1920.
[63] H. G. Teigan to F. Thoeneman, Dec. 6, 1921.
[64] W. C. Zumach to H. G. Teigan, Jan. 5, 1920.
[65] *Ibid.*, Sept. 27, 1920.
[66] Teigan to Zumach, Sept. 30, 1920. Bitter feelings

attempt was made to secure the campaign services of La Follette in Minnesota, he refused on the ground that the Thompson campaign was occupying much of his time. The Thompson campaign meant "a great deal to him personally. There can be no question that the foundation is being laid for a bitter fight against the re-election of Senator La Follette two years hence. Should Thompson be victorious in this fight it would, of course, give La Follette a tremendous advantage."[67] The aid of La Follette was sought largely because of his influence with the Scandinavian and German voters, his stand on the war having made him tremendously popular with the latter group.[68] Furthermore, it was felt that a La Follette appearance in the Twin Cities would lead to a press attack on him because of his war record and thus redound to the benefit of the League. That the League in Wisconsin in 1920 was in a disorganized state and dependent largely on the strength of La Follette was attested to by Emil Pladsen, the Wisconsin secretary and manager of the Nonpartisan League in a letter to Teigan. "We are at our wits end in the matter of devising some real practical and efficient plan for getting the state re-organized."[69]

Shortly thereafter, these same League leaders expressed the view that La Follette was "doubtful as to the stability of the League." Zumach also felt that La Follette was doubtful as to the political wisdom of tying up with the League.

> It seems to me that they [the progressives] have adopted a policy of watchful waiting to see whether the League will succeed in its re-organization. From conversations I have had with the Senator, I am sure that he is favorable to the idea of a new party; in fact, he told me some time ago that he would attempt during the next year to lay the foundation of such a new party. Conferences of Progressive Senators, Congressmen, newspaper men and prominent leaders have already been held to discuss this very proposition; at least, so the Senator informed.
>
> I am quite certain that the Senator's ambition is to become a candidate for the presidency of the United States, and that his only hope in so doing is to have a new party. I know that he was intensely interested in the convention of the forty-eighters in Chicago last summer, and was ready to head the new party as its candidate. This was conditioned upon the adoption of a platform acceptable to the Senator. You know the results of this convention, and I believe a splendid opportunity for the foundation of a new party was lost.[70]

Somewhat typical of the division existing among liberal groups was the situation then prevailing in Wisconsin. Pladsen, in writing Teigan, described the situation quite accurately when he said: "There is a meeting to be held in Madison tomorrow called by the People's Reconstruction League; La Follette is slated to speak there. With this People's Reconstruction League and the United Farmers of America, Farm Bureau, La Follette Progressive League, and the Equity Society, putting on a membership drive together with some little organization here in Dane County known as the Tax-Payers League, and considerable talk about organization work by the Farmer-Labor Party, it will be a matter of running the gauntlet between all these different organizations."[71]

Equally discouraging to the League in Wisconsin was "the extremely reactionary attitude of the administration. It is beginning to seep through into the consciousness of the people at large, the real League members and progressives, that the speech that a certain gentleman made last summer with reference to the Non-Partisan League program, 'I stand with both feet upon that program' was mere political camouflage."[72] The conservatism of the state administration reflected the views of a substantial portion of the population. League officials pointed out that "conditions in the northwest part of the state are better than over in the lake shore district."[73]

Briefly, it can be stated that La Follette, like many other liberal leaders generally, looked upon the League as a rival. Congressman J. H. Sinclair of North Dakota informed Teigan: "The Senator takes a broad national view of the whole progressive movement, and feels that a greater cooperation should be had among the various progressive groups . . . he hopes that the League in going into new territory will study the conditions that prevail

existed among Progressives because of Berger's opposition to the candidacies of Blaine and Thompson. The small showing of the Progressives in Milwaukee was attributed to Berger. Zumach to Teigan, Sept. 27, 1920.

[67] Zumach to Teigan, Oct. 13, 1920.

[68] Teigan to Zumach, Oct. 11, 1920.

[69] Emil Pladsen to H. G. Teigan, Oct. 29, 1920.

[70] W. C. Zumach to H. G. Teigan, Feb. 16, 1921.

[71] Emil Pladsen to H. G. Teigan, Mar. 24, 1921.

[72] *Ibid.*, June 24, 1921.

[73] Teigan to Pladsen, June 27, 1921; Pladsen to Teigan, June 24, 1921.

there and combine its efforts with the progressive forces there, rather than to supplant or antagonize them."[74] La Follette was said to have been greatly offended by the defeat of Senator Gronna by Dr. E. F. Ladd.[75] Teigan informed Sinclair that he would "like to see some move made to adjust matters in North Dakota with Senator Gronna. It is a lead pipe cinch that if things were fixed up with Gronna, the League would have easy sledding in the Flickertail State."[76] Gronna had been a faithful follower of La Follette during the war, and La Follette felt very grateful for his aid.[77]

It would be difficult to attempt to assess accurately the effects on the League of the growing coolness of the La Follette forces and the open hostility of the Socialist Party. These developments, particularly the progressive stand, helped divide and confuse the farmers who had come to look upon the League and the progressives as being pretty much the same thing. Yet, a couple of years later when La Follette made his bid for the presidency, these elements and numerous others united behind the progressive banner.

More tangible in its effect on the League were the rival farmer organizations which appeared and were threatening its position not only in North Dakota but also in Minnesota, Iowa, Wisconsin, and in many other states where the League had displayed some semblance of vote-getting power. The organization most powerful in the early twenties was the American Farm Bureau Federation that was organized in Chicago in the fall of 1919. It made a tremendous appeal to the farmers of the Middle West. Generally speaking, the federation appealed to the more conservative elements who were opposed to the League. Its real display of power was in states in which the League failed to obtain a strong membership.

County-agent work in Iowa, the forerunner of the farm bureau movement there, had started in 1912 when the first farm bureau was organized in Iowa County. When the United States entered the war, the number of counties in which county agents were at work had increased to 24, largely in an attempt to stimulate food production.[78] In December 1918 at a meeting held in Marshalltown to organize a state federation, 70 counties responded to the invitation. Financial assistance from both the federal and state governments, plus the cooperation of Iowa State College, were powerful aids in the organization work.[79] Membership in the Iowa Farm Bureau Federation fluctuated; on December 1, 1920 the membership was placed at 92,000; on September 1, 1921 it was given as 124,000, but on September 15, 1921 the membership was placed at 60,250, and the number of county farm bureaus was given as 100.[80]

The North Dakota Farm Bureau Federation was organized in January 1921 when both the Nonpartisan League and agriculture were beginning to flounder in the depths of depression. In 1921, 35 counties were said to have been organized with a total of 23,679 members; the paid-up membership on September 15, 1921 was 7,705. Although the North Dakota Farm Bureau shortly became involved in financial difficulties, it nevertheless contributed to the confusion of the depressed farmers who already had faced several years of crop failures, low prices, a variety of agricultural reforms, plus disillusionment over the accomplishments of the League. Less aggressive, but equally important, was the Wisconsin Farm Bureau which claimed a membership of 12,548 and a paid-up membership of 5,015 in September 1921. Eighteen county farm bureaus had been organized. Montana had no farm bureau membership on December 1, 1920, but in September 1921 a membership of 7,200 was claimed, and 30 counties organized. Minnesota, the state which the League had tried desperately hard to organize, reported a membership of 72,000, of which 39,000 were designated as "paid-up." Seventy-eight county farm bureaus were organized. The Minnesota Farm Bureau, to this day, has remained one of the most prominent of state farm bureaus. A good "foothold" was also temporarily obtained in Nebraska where a "paid-up" membership of 19,082 was claimed in September 1921. The South Dakota Farm Bureau was organized in February 1919 at South Dakota State College, and on September 15, 1921 when a "paid-up" mem-

[74] J. H. Sinclair to H. G. Teigan, July 15, 1921; Teigan to Sinclair, July 20, 1921.

[75] Sinclair to Teigan, July 13, 21, 1921.

[76] Teigan to Sinclair, July 20, 1921.

[77] Sinclair to Teigan, July 13, 1921.

[78] *Iowa Farm Bureau Messenger*, Nov. 5, 1919; Barton Morgan, *A History of the Extension Service of Iowa State College*, 34–40 (Ames, 1934).

[79] C. R. Dudley to D. Davis, Feb. 17, 1938, in the office of the American Farm Bureau Federation, Chicago.

[80] American Farm Bureau Federation, *Report of the Executive Secretary . . .*, 1921, p. 29.

bership of 11,237 was reported there were 39 county farm bureaus organized.[81]

Equally menacing to the Nonpartisan League was the Farmers' Union which was making a strong bid to obtain a large membership in the Middle West. The opposition to the League program in Kansas was demonstrated by the Kansas Farmers' Union which campaigned openly against the "subversive doctrines" of the League. Nebraska also had adopted strong measures against the League. The Farmers' Union, however, made greater progress in organizing in such states as Montana and North Dakota than did the American Farm Bureau Federation. By the end of the twenties, the Farmers' Union became the largest farmers' organization in both these states.[82]

League leaders who were quick to realize that the League had about run its course and who were anxious to capitalize on what remained of the organization, had become interested largely in the formation of a Farmer-Labor Party. Chief advocate of this new alignment was H. G. Teigan, secretary of the Nonpartisan League. Opposed to this farmer-labor alignment was the "balance of power" plan of A. C. Townley, president of the League, who urged "that support be given to such candidates of any party as were regarded as desirable, thus controlling the balance of power."[83] This was simply the old device of selecting reform candidates through the old parties.

Teigan had been espousing the third-party move for some time prior to the League defeat in the recall election. On November 10, 1919 he wrote Zumach that he was "going to Chicago for the 22nd to act as a sort of unofficial delegate at the Labor Party convention"; but a week later Teigan wrote to his brother in Chicago that, "in as much as the League could not officially participate, it would be unwise to have any unofficial representative in attendance."[84]

[81] *Ibid.*, 1921, p. 29–31; *Fargo Forum*, Dec. 4, 1922; *Early Organization of the South Dakota Farm Bureau Federation*, 1 (n.p., n.d.).

[82] For accounts of the Farmers' Union, see the following booklets: Northwest Division, *The Farmers Educational and Cooperative Union of America* (St. Paul, 1930?); *North Dakota Farmers' Union* (Centuria, Wis., 1936); *Montana Farmers' Union* (Jamestown, N. Dak., 1937).

[83] "The Nonpartisan League Fights On," *Nation*, 114:711 (June 14, 1922). See also Minnesota Farmer-Labor Convention, *Proceedings*, 1923, p. 24; *Minnesota Leader*, Feb. 25, 1922.

[84] H. G. Teigan to W. C. Zumach, Nov. 10, 1919; H. G. Teigan to Martin Teigan, Nov. 17, 1919.

Teigan again repeated his views on the idea of a third party in a letter to H. W. Laidler, a prominent American Socialist writer. Laidler had addressed a letter to Townley which read in part: "We are particularly desirous of finding out what changes in tactics, if any, you believe that the labor movement and the minor political parties should make if they are to do their most effective work."[85] Teigan, in replying for Townley who was not in the habit of answering correspondence, said: "In my opinion, a change in the political tactics of the labor movement is absolutely necessary to offer any hope of success. A political party, organized along the lines of the British Labor Party, looks to me as offering the best means of political expression for the working class. The Farmer-Labor Party is a good start in that direction, though it may need a little 'revamping,' so to speak, to make it more workable."[86] A. W. Ricker, who later joined Townley as editor of the *Farm Market Guide*, official organ of the National Producers' Alliance, summarized the two divergent views developing within the League as, "one the practical—trying to get something of the campaign—the other—the Utopian—building a party. Party building at this time is impractical—The country is in a state of flux—."[87]

Much uncertainty prevailed regarding the future of the League while Townley was serving six months in jail on charges of disloyalty and sedition. Many had hoped that the jailing of Townley would make a martyr of him and thus revitalize the League. Meanwhile Teigan had been campaigning for a farmer-labor party. In January 1922 he wrote to one D. C. Dorman that labor was opposed to the balance of power plan; it had functioned along those lines for a number of years and received nothing from it, adding that "Gompers . . . is a balance of power man." The Minnesota Nonpartisan League was said to have been favorable to the balance of power idea, but it was considered unwise to pursue the plan if labor refused to follow suit. "To have the League going one direction and labor another would mean a split in their forces which could not be compensated for no matter how successful the balance of power plan might work out in the state."[88]

[85] H. W. Laidler to A. C. Townley, Nov. 22, 1920. This information was gathered for the *Socialist Review* which was sponsoring a symposium on the "Lessons of the Recent Elections."

[86] H. G. Teigan to H. W. Laidler, Nov. 26, 1920.

[87] A. W. Ricker to H. G. Teigan, Sept.13, 1922.

[88] H. G. Teigan to D. C. Dorman, Jan. 13, 1922.

On the day that Townley was released from jail, his associates had planned a huge banquet to which liberal leaders from the Twin Cities area were invited. Townley was to be the honor guest. The balance of power plan was still uppermost in his mind, but contrary to the advice of some League leaders who had gone over to the farmer-labor idea, Townley insisted on advocating the plan. Reports were that his suggestions were received coldly. At any rate, Townley tendered his resignation as president of the League in May 1922 but offered to stay as supervisor of the national organization. Townley had made recommendations to separate the political activities of the League from the organization work prior to his resignation.[89]

Both the National and the Minnesota Nonpartisan League accepted the reorganization plan of Townley for separating the political and organizational activities. The national committee also announced that it had approved of the Townley plan to reduce membership fees from $18 for two years to $6.50 or $7.50 for the same period, depending upon the organization problems of the various states. In Minnesota, the state committee approved a new fee of $6.50; in other states where organization work was more costly the $7.50 fee was adopted.

Judging from the tone of his letter of resignation, Townley had been losing faith in the political formula for agricultural relief.

> I have finally reached the conclusion that a strong, active and numerous membership in each state is the only basis upon which political and economic success can be built, and that in striving for the election of candidates we have lost sight of the important things. In other words we have devoted almost all our force and energy to seeking the election of our selected candidates and have neglected the re-enrollment of old and securing new members.
>
> And finally and most important of all, I have concluded that this neglect of enrollments and failure to give it first attention was due to the fact that in each state we have been endeavoring to carry on both political and economic functions through one set of executives. It is my opinion that this work of enrolling members is a business function, requiring specialized training, and is inevitably bound to be neglected and fail, if required of men who are at the same time engaged in the business of looking after the political activities of the league.

The withdrawal from power of such leaders as Townley meant that the organization which had appeared with dramatic swiftness in 1915 was about extinct. He was perhaps the most important of the few individuals who in the early days had applied to political organization the methods of high-pressure salesmanship. The key to the rapid growth of the League, perhaps, was not due to the proposed remedies for state ownership but rather to the large-scale application of the techniques of oil-stock salesmen. As a result, a political organization was formed, financed from the bottom up by the rank and file, instead of from the top down.

Repeated charges of mismanagement were hurled against Townley, but at no time were they ever substantiated. There were, however, strong evidences of looseness in financial bookkeeping and also an absence of real responsibility on the part of the rank and file. Perhaps one of the strongest indictments was the readiness of the League's leadership to embark on new ventures without the necessary experience and personnel. Especially trying were the effects of the depression, beginning in 1921, when the League found it impossible to continue organizing on the commercial basis which had proved so successful in earlier years. An annual income of some seven million dollars dwindled; large sums of postdated checks could not be collected; the League as an organization had to cease functioning; and its newspapers one by one were sold.

The charge that an organization had to be built upon an economic base was perhaps correct, otherwise movements like that of the League and the Populists would fade out as completely as did the latter in the nineties. Mass movements are of temporary duration unless founded upon an economic organization that functions every day of a year; they must have strong local units; they cannot be maintained if they are to perform vital functions only once every two years.

Despite these shortcomings in organization, all the things the League campaigned for were not in vain. "As in all movements," wrote one authority, "some of the leaders sold out. Republican and Democratic candidates stole the League's thunder by promising or half-promising the same thing the League endorsed candidates pledged,

[89] *Wisconsin State Journal*, Mar. 26, 1922; *Minneapolis Star*, May 12, 1922. H. F. Samuels of Idaho, chairman of the state committee of Idaho and League candidate for governor of Idaho in 1920, was chosen temporary president of the League. *Minneapolis Star*, May 12, 1922.

and they were running on the same ticket. Nonpartisan methods were obviously a failure, and the remaining members of the League decided to try something else." The visible machinery of the League, in large measure, had melted away, but League sentiment persisted in the minds of hundreds of thousands of farmers in North and South Dakota, Minnesota, Wisconsin, Nebraska, and other states in the Northwest and Far West. As long as the price of wheat remained low, this viewpoint was likely to be a factor of political significance.[90]

[90] "Minnesota, the Nonpartisan League, and the Future," *Nation*, 117:102 (Aug. 1, 1923). A former editor of the *Nonpartisan Leader*, Charles Edward Russell, gave his explanation of the League's decline in his *Bare Hands and Stone Walls*, 343–344 (New York, 1933).

MAJOR TRENDS IN CALIFORNIA AGRICULTURE

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There have been three main trends in agriculture on the Pacific coast: pastoral, grain, and fruits.* All overlap to a certain extent, and each is still dominant in regions defined by climatic and soil conditions.

The Pastoral Era. The first settlers were limited by the lack of equipment and labor for tillage and of transport to markets. Prior to 1848 the most profitable products of the land were hides and tallow. The half-wild cattle which roamed the hills and valleys were lean and lank, but since they were valued principally for their hides, that did not matter greatly. The Spanish Californians did not like to milk cows and little of it was done, except as milk was needed for children and for making a small amount of cheese. The native grasses, either green or dry, afforded excellent feed. The "filaree" (Erodium) which was unwittingly introduced from Mexico soon spread and proved to be an important pasture plant.

The sudden increase in the population of California due to the Gold Rush created an enormous and ever-expanding market for beef. To supplement the local supply, large herds were driven into central California from the Midwest, Texas, and southern California. It is true that forays by Indian tribes and depredations by cattle thieves occasionally made inroads on the herds, but enough got through to make the ventures profitable.

The great flood of 1861–62 was followed by two years of drought, when cattle were again solely valued for hides and tallow. Thousands of carcasses and heaps of bleaching bones strewed the country which was once good pasture. The days of vast ranchos supporting great herds of half-wild cattle were ended by 1872.

During the pastoral era there was more or less significant activity in plant introduction and acclimatization in the coastal region of California. The Spanish priests brought seeds of various agricultural plants from Mexico and planted them in the vicinity of the missions. Although we have scant records of their introductions, we may assume that they brought varieties they had known in Mexico, and these in turn were derived originally from the Mediterranean regions of Europe and North Africa. Some of them in fact still bear their Moorish names, such as alfilaria, alfalfa, and almond.

Grape culture which was limited in the pastoral era to small vineyards at the missions has grown to over half a million acres. About half of the acreage is devoted to the production of raisin grapes, one-sixth to table varieties, and the remainder to wine grapes.

The Grain Era. The great interior valleys of California began to be cultivated for grain in the 1840s by men like John Sutter. In spite of political turmoils and severe droughts these men demonstrated the possibility of producing wheat on a large scale. The important grain-producing region in eastern and southeastern Washington was not developed for several decades.

Prior to the discovery of gold, farms producing mainly livestock but also grain and fruit had been established along tributaries of the Sacramento River, on which the yields were very large, albeit

* This paper was presented as part of a symposium at a meeting of the Western Society of Naturalists at Mills College on December 28, 1945.

the methods of cultivation were crude. The grain and hay afforded a supplementary supply of feed for the livestock. The culture of the cereals was the incentive to settle and plant acreages without great capital investment. As a consequence there was an influx of farmers in the unsettled times which followed the Civil War. Wheat was imported into California from 1846 to 1854, but afterward its culture expanded, and in 1860 it was an article of export. The grain farms established in the Great Central Valley during the sixties and seventies were on a scale hitherto unknown in the United States. Farms of 2,000 to 5,000 acres were small in comparison with some of 20,000 to 40,000 acres.

Wheat production in California increased from less than 6,000,000 bushels in 1860 to 41,000,000 in 1890. The encroachment of other crops and enterprises and increases in land values, along with a necessary shift from extensive to more intensive agriculture, resulted in a gradual decline in production to only 4,200,000 bushels in 1913. Since that time the trend has been upward, with an annual production of about 11,000,000 bushels. This is less than half of the present wheat requirements for human food and feed for poultry and livestock in California.

Barley now supersedes wheat in importance, supplying the main grain ration for livestock. The yield increased from about 4,000,000 bushels in 1860 to over 46,000,000 in 1910. It is grown instead of oats because it is more drought-resistant.

Rice ranks third among the cereal crops grown in California, being exceeded only by wheat and barley. The first commercial rice crop was grown in 1912 at Biggs in the Sacramento Valley. The high acre yields and large profits resulted in the rapid expansion of the industry until now the annual production ranges around 7,000,000 bushels. The leading variety, Caloro, was developed at the Biggs Rice Field Station.

The Fruit Era. The Pacific Coast States are now the area of intensive fruit culture. The apples of Washington and Oregon and the peaches, prunes, grapes, and oranges of California give these States a unique agricultural position. The fruit era began in the 1870s when large-scale irrigation systems were constructed to bring water diverted from rivers onto agricultural land. Eventually, there was inaugurated the development of smaller farming units and towns. The number of irrigated farms in California rose from 26,000 in 1900 to 84,000 in 1940. Because of the distance from markets which could absorb large quantities of their products, the western fruit growers learned how to dry or to distribute their fruits under refrigeration to distant consumers. According to S. W. Shear of the Giannini Foundation the farm value of fruit and nut crops in 1939 was 45.5 percent of all crops produced in California. Between 1919 and 1939 the production of citrus fruits doubled, and the increase of grapes and other fruits was about 50 percent. It is highly improbable, however, that the recent increase in the production of Pacific Coast fruits will continue unless new trends are established in per capita consumption and in foreign trade.

Cooperation, an important biological trait highly developed in certain insects, has been crudely and imperfectly used by the race of anthropoids which engages in agricultural production and marketing. Some of the fruit industries of the Pacific Coast have successfully utilized this trait and have sold their produce in remote markets close to other fruit regions where the industry lacks the coherency of the western farmers.

California agriculture presents other significant trends. The number of farms doubled in the first thirty-five years of the twentieth century, and the average size decreased from 397 to 202 acres. This means a greater proportion of owners working on farms, and therefore a more stable rural population. It is true that farm laborers, in some cases, have better incomes and better homes than many small independent farmers, but the lack of stability and the frequency of migration of the former class lie at the root of many rural social problems.

Plant Introductions. The Pacific Coast States have been and still are pioneering in agriculture, and their important crop plants have been brought from elsewhere. Little Club wheat, which is cultivated in California, was brought from Mexico by Spanish priests, and its seeds have been found in the adobe bricks of old buildings. The padres also brought and planted olive trees on the mission grounds, hence the name given to the variety, the Mission, which is more widely grown and more profitable than any other since introduced.

Citrus fruits came from the Iberian Peninsula by divers routes. The first sizable orange grove in California was set out in the garden of the San Gabriel Mission in 1804, where its subsequent

success demonstrated the fitness of the soil and climate for that fruit. The dramatic story of the introduction of the Washington Navel orange in 1873 by Mrs. Eliza Tibbets of Riverside has often been recounted. From the two trees which she raised came the budwood for propagating the thousands of trees whose produce constitutes an important source of income to California. The Valencia orange was introduced in 1876 and planted on the ranch of A. B. Chapman at San Gabriel. It has proven valuable because its fruit ripens in the summer, whereas the Washington Navel ripens in winter.

Luther Burbank's fame as a horticulturist cannot be disregarded, despite his innocence of scientific methods. He came to California in 1875 two years after he had originated the valuable variety of potato which bears his name. He imported many seeds and plants from the Orient, some of which, like the Satsuma plum, are still of commercial importance. The Santa Rosa plum and the Shasta daisy are among the best of his plant-breeding results. Burbank's arrival at the beginning of the fruit culture era was opportune. Although fresh fruits could not then be shipped to the Eastern States, there was a great demand for dried fruit. The California sunshine was ideal for drying prunes, peaches, and apricots. Burbank's nursery was in a position to furnish such trees when the boom in orcharding started.

Truck Crops. Within the last generation, there have been fads and fancies in our diets which have materially altered the food consumed by the American people. The woman who would retain her girlish figure now lives on vegetables which were scarcely ever eaten in her grandmother's day. The increase in the number of persons now engaged in sedentary occupations and the increased mechanization of the industries call for food low in calories and high in vitamins and minerals. This change in dietary habits is reflected in the agriculture of the Western States which produce more than two-thirds of all the lettuce sold commercially in the United States, two-thirds of the carrots, and nearly two-thirds of the asparagus. In California the acreage devoted to growing truck crops rose from 79,000 in 1909 to 537,000 in 1943 and is still increasing. It is possible that we are witnessing the development of a Market-Gardening era.

Plant Diseases and Insects. As the Pacific Coast States changed from a pastoral to a horticultural status, many new problems in the maintenance of fruit yields demanded attention. The virgin soil for a time produced large crops of high-quality fruit, but that Edenic condition soon disappeared and often the fruit farmers—man and wife, as in the case of our ancestors, Adam and Eve—were evicted by the stern angel of diminishing returns. The barren trees finally died. The uncultivated land then supported a growth of grass and weeds which served as pasturage for herds of scrawny cattle. From the northern border to the venerable sun-baked missions in the south, "the vine languished and the merry heart did sigh."

Soil amendments, which included such a range of materials as chicken feathers and garbage tankage, were employed, sometimes with success, but often contrariwise. The fruit trees were affected with conditions which were termed "dieback," "yellow leaf," "sour sap," "mottle leaf," "little leaf," "decline," and others which connoted a general lack of vigor and vitality. By an extensive series of controlled experiments in the field and in the laboratory, it was eventually proven that small amounts of the so-called minor elements could often restore the languishing trees to health. The injection of small quantities of iron or manganese or boron into trees proved remarkably successful. The application of zinc salts, either to the root of the tree or as a spray on the trunk and leaves, was also effective for controlling the diseases classed as mottle leaf and little leaf.

Plant diseases and insects made their way into the paradise of the early fruit-growing era. Eventually, the beautiful fruits were marred or disfigured by the attacks of the insidious enemies, which, being unseen, crept in and established themselves within a few decades. The farmers appealed to the biologists for information about methods of plant-disease control. Long experimentation and study were necessary before successful procedures could be developed. A highly efficient quarantine service kept out many insects and diseases.

Pacific Coast horticulturists have been remarkably capable in devising new methods for the protection of plants by selective chemical agents which kill parasites with minimum damage to the plants. Dilute lime-sulfur solutions for summer spraying alone or in combination with lead arsenate were first used in Oregon and Washington. Emulsions of petroleum oils which have come into wide use were the result of investigations by biolo.

gists and chemists associated with experiment stations and oil refineries. Fumigation with hydrocyanide gas is a standard method for control of scale insects on citrus and other fruit trees.

At the present we hear much of a new insecticide called DDT whose efficacy for the control of those pests which annoy man is almost beyond belief, and we are confronted every day with questions about its use in agriculture. Insofar as reports of reliable tests are available, DDT has great promise, but it cannot be used indiscriminately. The crop plants are not injured if the material is suitably applied, but time will be required for entomologists to work out the agricultural problems involved. It may well be that an insecticide which kills 50 percent of the pest insect and none of its predators or parasites may be more valuable than one which kills 95 percent but at the same time eliminates its natural enemies.

In many places men observed a sort of biological control by insect parasites in which some predatory insects had become established and parasitized either the adult or the egg of an insect—the old story of the big flea and the little flea on its back! Eventually, entomologists made a serious study of the matter and determined what insects were acting to control the parasites. Out of that work grew a romantic development of biological control of insect parasites. The beneficial insects were sometimes found in other countries and brought here by skilled collectors, who often had great difficulty in keeping them alive on the long journey.

The successful culture of the Smyrna type of figs in California is due to the work of men who introduced the Blastophaga wasp which pollinates the pistillate flowers. This highly important insect was first sent from Smyrna to Gustav Eisen in San Francisco in 1891 in a dozen caprifigs containing Blastophaga females. As soon as received the insects were liberated in the orchard of James Shinn at Niles, Alameda County. There is no record that they became established. After other unsuccessful attempts, the insects were established at Fresno from a shipment of caprifigs sent from Algeria by W. T. Swingle of the United States Department of Agriculture.

Retrospect. A hundred and fifty years ago, agriculture was virtually nonexistent in California except in the vicinity of the Spanish missions. When lands were plowed and cultivated, new plants and new problems were introduced, often simultaneously. Varieties of plants have been evolved which are adapted to the region in which they are grown. Others are resistant to insects and fungus diseases. The discovery of chemicals for the control of pests was a great advance, and modern research is directed toward the production of safer and more efficient compounds. Serious crop failures were avoided when the causes were discovered, often after baffling obstacles had been overcome through coordinated research. Agricultural yields are being not only maintained but increased, as is shown by the unprecedented crops produced in 1942. We have confidence that biological work will produce equally great benefits in the making of that tomorrow to which we confidently look forward.

NEWS NOTES AND COMMENTS

RESEARCH IN PROGRESS

Professor Robert G. Dunbar of Colorado A. and M. College is preparing a history of agriculture in Colorado. He is also giving a course on the history of irrigation in the United States as part of the curriculum of the Institute of Irrigation Engineering, a division of the Graduate School of Colorado A. and M. College.

Dr. James Eckman of the Mayo Clinic, Rochester, Minnesota, is investigating the observations of English travelers on American agriculture during 1875–1920.

Professor Rudolf Freund of North Carolina State College of Agriculture is completing his research and writing on the history of Swedish agriculture. He is also investigating the ideas concerning the nature of landed property during the eighteenth century and their role in establishing absolute ownership in land in the United States.

Professor Wilbur H. Glover of the University of Wisconsin is working on the history of agriculture and the College of Agriculture in Wisconsin.

Dr. Marshall Harris is on leave of absence from the United States Bureau of Agricultural Economics to complete his study on "The Genesis of the Land Tenure System of the United States." His main concerns are developments during the colonial period and the delineation of the forces that determined in large part the basic decisions regarding land tenure during that time.

Professor Earl W. Hayter of Northern Illinois State Teachers College, DeKalb, is doing research on the oleomargarine controversy, swindles and frauds among

the western farmers, and the patent system and agrarian discontent during 1870–1890. He is also investigating the American enclosure system.

Dr. William D. Hoyt of the Maryland Historical Society is studying farming on the Ridgely Plantation, Baltimore County, Maryland, in the late eighteenth century and the agricultural operations of the Shrivers at Union Mills, Maryland, in the early nineteenth century.

Professor Weymouth T. Jordan of Alabama Polytechnic Institute is investigating the history of Mobile, Alabama, in the 1850s.

Professor Earle D. Ross of Iowa State College has completed a manuscript for the State Historical Society of Iowa on "Iowa's Leading Interest: A Centennial History of Agriculture" which is to be published as soon as printing conditions permit. He is also preparing articles on the following subjects: Some Confusions in the Administrative History of the United States Department of Agriculture; Samuel T. K. Prime and His Survey of Model Farms; The Boosting Agricultural Literature, 1900–1912; The Origins of the Country Life Commission; Writings on Agricultural History in the United States to 1876; The Origins and Work of the Congressional Agricultural Committees to 1860; and The Origins of the Term, "Agrarian Revolution."

Professor Theodore Saloutos of the University of California, Los Angeles, has completed a manuscript on "The Equity Movement." He is collaborating with Professor John D. Hicks on a study of "Agrarian Discontent in the Western Middle West, 1900–1939."

Dr. Hubert G. Schmidt of the Illinois State Historical Library plans to edit the Capner Correspondence and Papers, a collection of manuscripts relating to the agriculture and rural life of New Jersey and Leicestershire, England, during 1780–1810.

Dr. Carl C. Taylor of the United States Bureau of Agricultural Economics is working on "The Farmers' Movement in the United States."

Dr. Mildred Throne of Ottumwa, Iowa, has completed a doctoral dissertation at the State University of Iowa entitled "A History of Agriculture in Southern Iowa, 1833–1890."

Dr. Nannie M. Tilley of Duke University is currently working on "The Career of Daniel Lee, Agricultural Reformer (1804–1890)" and "The New York State Agricultural Society in the Movement for Agricultural Education."

Colonel Edward N. Wentworth of Armour's Livestock Bureau is completing a study of "America's Sheep Trails" which is to be published in the fall of 1946. He is also working on the history of swine.

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